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"The spirit of man is as the lamp of God, wherewith he searcheth the inwardness of all secrets."—SOLOMON.

"The introduction of noble inventions appears to hold by far the foremost place among human actions; and so the early ages determined. For to the inventors of things they ascribed divine honours; but to those who deserved well in civil matters they adjudged the honours of heroes only. And certainly, if one compares them rightly, he will find this judgment of the old age to be just. For the benefits of inventions may belong to the whole human race, the civil exclusively to certain sects of men; these, again, endure not beyond a few generations; those, as it were, through perpetual times."—BACON.

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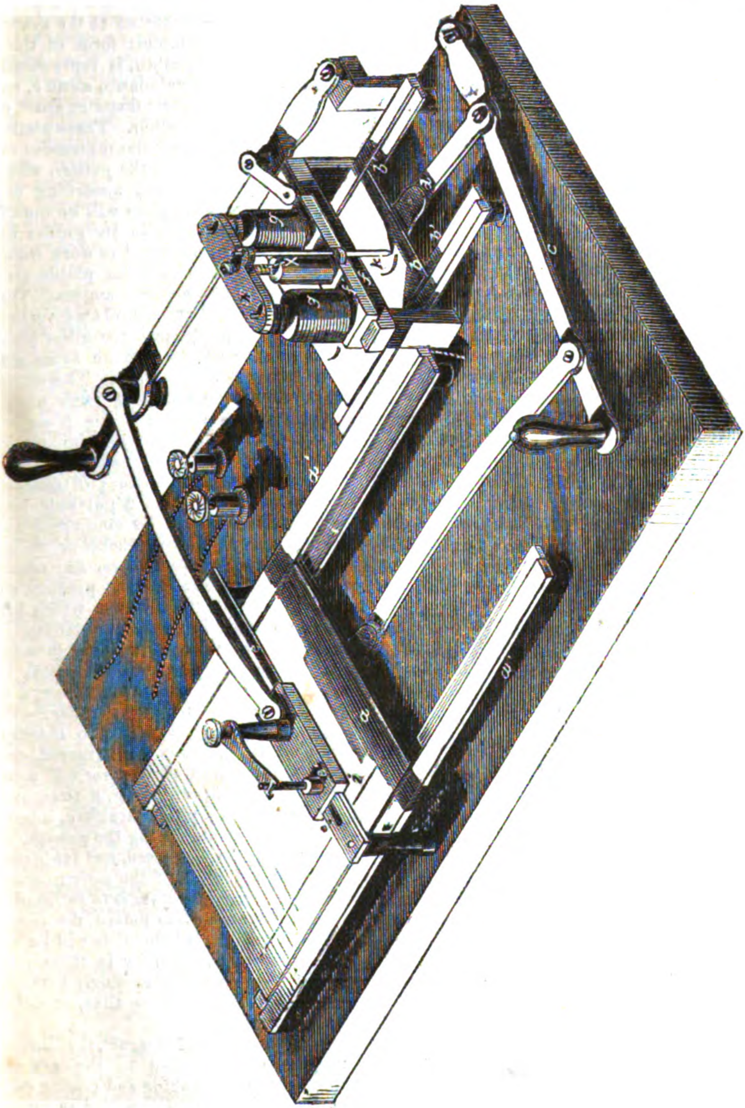
IMPROVEMENTS IN ENGRAVING AND COPYING BY ELECTRICITY.



IMPROVEMENTS IN ENGRAVING AND COPYING BY ELECTRICITY.

Patent dated 23rd June, 1857.

Mr. R. A. Brooman has obtained a patent in this country on behalf of an American gentleman, for certain improvements in machinery in connection with the employment of electro-magnets for producing copies of designs, drawings, patterns or devices, or for regulating and bringing into action a graver by breaking and closing an electric circuit in accordance with some previously prepared design or figure. The passage of this design or figure under a "style" will effect the breaking and closing of the circuit, and thereby bring into action the graver situated at a distance, but moving in a regulated manner and governed by the action of the style, whereby movements will be imparted to the graver at the moment of the breaking and closing of the circuit. The simplest form of this invention, whereby the general view may be had of its scope and design, is represented in the engraving on the preceding page, and consists in having two metal plates, *a* and *b*, one of which, *a*, is a conductor of electricity. These plates are placed at a short distance apart, each plate moving in guide frames, *a* and *b*, lying parallel to those of the other. These plates are connected by a lever, *c*, so that a movement of one plate transmits a similar movement to the other along these guides. One of these plates, as *a*, will have upon it the pattern which is to be copied, and the other, *b*, is the plate intended to be engraved according to the pattern. If the design is to be on a reduced scale, then this latter plate will be moved by a link, *d*, placed near to the fulcrum of the lever, its movements in its guides being reduced accordingly, and *vice versa*; if enlarged, its link will be arranged to work from the long end of the lever. Centrally placed over the paths of each of these plates are two other sets of guide-rails, *e* and *f*, striding the first named guides, at right angles. That at *e*, over the pattern plate, has a slide into which is fixed a pointed style, *i*, placed vertically, its point resting upon the pattern plate beneath. Upon the guide, over the other plate, is affixed also a slide, *f*, upon which is a helix, *g*, with magnets, and an armature, *h*, placed properly for being actuated in the usual manner of electro-magnets. The armature has affixed to it a graving tool, *k*, standing vertically, having its cutting edge when the armature is not in contact with its magnet, just above the surface of the plate to be engraved. The slide, *e*, having the style *i*, in it, and the slide *f*, with the magnetic armature, &c., are also connected together by a lever, *l*, so that the movement of one will produce a like movement in the other, or with the proportional differences of motions, if arranged for enlarging or diminishing, as before stated for the plates. A galvanic battery is now put in connection in such way that one pole thereof will be connected to the pattern plate, and the other pole to the style over that plate, so that whenever the style touches the pattern plate, the circuit will be broken, and when passing over any conducting substance on it will be closed. The effect of this upon the graver is to produce a like action, the closing of the circuit bringing the armature, *h*, upon the magnet which brings the graver, *k*, upon the plate, *b*. Now, if while the circuit is closed the pattern plate *a*, be moved a certain distance, then will a line be engraved upon the plate *b*, in accordance with the extent of its movement. By coating the pattern plate with some non-conducting material, as varnish, and drawing thereon down to the metal any device, a copy may be engraved by moving the plates and style in the following order:—First, bring the style, *i*, to one side of the pattern plate, the graver, *k*, will also thereby be transferred to one side of its plate. When the style, as the plate is being moved, comes into contact with it, the circuit will be immediately closed, and the graver will also be brought to press upon its plate; the pattern plate now being drawn along, a straight line will be engraved upon the plate, *b*, until the style on *a* strikes a place varnished, when the circuit will be broken, and the graver will be lifted off its plate during the passage over the varnished surface. On leaving that, the circuit will again be closed, and the graving go on again; this interruption taking place as often as a portion of the pattern plate is intercepted during the passing of that plate under the style. The style is to be lifted up, and the pattern plate returned to the first position, then the style moved the distance across for a next line, and the operation repeated. Thus, the whole plate will be gone over in parallel lines, and the plate, *b*, in like parallel lines, whereby in those places in which the circuit has been broken by the figures, this plate will accordingly have been engraved in fac-simile if the movements of the two plates have been alike, or will be enlarged or diminished, if actuated as already stated.

Instead of operating the graver directly by the armature and magnet, the inventor proposes various modifications in which this may be accomplished by the armature setting in operation some suitable machinery according to the breaking and closing of the circuits by the pattern. The use of the invention may also be extended to carving, weaving, etc.

THE CHEMISTRY OF PIGMENTS.
No. II.

BY DESMOND G. FITZGERALD.

OIL AND WAX AS VEHICLES IN PAINTING.

Among the ancients, wax was the principal vehicle for pigments; and the advantages attending its use have not, perhaps, in our time been sufficiently appreciated. Its preservative effect, both upon the canvas and the mass of colouring material in a painting, is its great recommendation; and it is found that this effect is continued when the proportion of wax employed is but small. Oil, and more especially drying oil, has a contrary effect; and its affinity for oxygen tends both to the destruction of the canvas, and to promote chemical action among the pigments, unless some protective agency is employed. Hemp which has been imbued in oil has even been known spontaneously to burst into flames; and this fact is a sufficient proof of the energetic action which takes place when vegetable substances are left at a certain temperature in contact with fatty bodies.

Many pigments which cannot, on account of their changeable or fugitive nature, be employed simply as oil colours, may safely be used under the preservative influence of wax. Thus, chrome yellow, verdigris, orpiment, gamboge, and the lakes, together with the metallic oxides, which are changeable in oils, may readily be made available to the painter, and subservient to the interests of art.

Indeed, in every portion of a painting, wax appears to have its sphere of utility. Added in small quantity to mastic and other varnishes, it prevents the cracking which is consequent upon their contraction and the loss of their tenacious elasticity in drying; and, again, the advantage it affords of preserving the back of the canvas from the influence of moisture might well be profited by. We are told that Titian painted on a red ground, and imbued his canvas at the back with bees'-wax dissolved in oil.

Wax, which is distinct in its properties and reactions from the fatty bodies in general, has been described by Thomson as a kind of deoxidized oil. It is the purest and most unalterable of all unctuous bodies. Speaking of the wax encaustic painting of ships among the Greeks, Pliny observes, "Quæ pictura in navibus nec sole, nec sale, ventisque corrumpitur." When bleached, it melts at 158° Fahr., and congeals at 149° Fahr. Hot oils, both volatile and fixed, readily dissolve it. It is not changed by exposure to the atmosphere, and is scarcely acted upon by the strongest acids.

The fluid portion of oil, or oleine, is a compound of oleic acid with the oxide of glyceryle; and the solid portion, or stearine, of stearic acid in combination with the same base. When for this base we substitute an alkali, such as potash or soda, soap is produced; and the fat acids may also be made to combine with various oxides, forming plasters or metallic soaps. The oxide of lead, for instance, when boiled with olive oil, forms diachylon plaster, or, if but a small quantity be used, the oil acquires peculiar drying qualities.

It was in profiting by this circumstance that quickly drying oils were first produced for the purposes of art. Besides the oxides of lead, the acetate of the same metal, the sulphate of zinc, and latterly the protoborate of manganese, have been found available for the purpose of communicating a drying quality to oil. The explanation of this appears to be that the oxide of glyceryle is sufficient to hold in combination the acid of these salts, and that a double decomposition occurs which is of sufficient permanence for the object in view, namely, the speedy desiccation of the oil, an effect which depends upon the combination of the metallic oxide.

Thus, instead of

$$\text{Oil}\left\{\begin{array}{l}\text{Oleic and stearic acids}\\ \text{Oxide of glyceryle}\end{array}\right.$$

and

$$\text{Sulphate of zinc}\left\{\begin{array}{l}\text{Sulphuric acid}\\ \text{Oxide of zinc}\end{array}\right.$$

we have

$$\begin{array}{c}\text{Oleate and stearate}\\ \text{of zinc}\end{array}\left\{\begin{array}{l}\text{Oleic and stearic acids}\\ \text{Oxide of zinc}\end{array}\right.$$

and

$$\text{Sulphate of glyceryle}\left\{\begin{array}{l}\text{Sulphuric acid}\\ \text{Oxide of glyceryle.}\end{array}\right.$$

If, however, as is remarked by Field, we use the oil rendered drying by the sulphate of zinc, together with that which owes its drying qualities to the acetate of lead, we obtain by double decomposition two new compounds, the acetate of zinc, which is an ill dryer, and the sulphate of lead, which is insoluble and opaque; the oil is also restored to its original condition. The fact of this chemical barbarism being recommended in various works upon art, is an instance of the necessity of scientific guidance in the manipulation of the various materials of the painter's art.

When exposed to the air, the fixed oils become yellow, viscid, and rancid, and also acquire an acid reaction. They then absorb oxygen from several pigments, as in the case of red lead, which often blackens in oil; but, according to Montabert, this is prevented by the addition of resins or wax.

Little is known respecting the acid nature of rancid oil, or of the phenomena of its fattening, becoming leathery, and drying with absorption of oxygen; but the oleic and stearic acids approximate so nearly in

their composition as to lead to the supposition that the one may be occasionally converted into the other, producing the first mentioned of these phenomena:

	C.	H.	O.
Oleic acid . . .	26	23	4
Stearic acid . . .	36	36	4 Heintz.

A solution of wax in the oleate of glycervle might probably with great advantage replace the crude oil in the preparation of colouring materials; and experiments are now being made to ascertain the fact. The bleached oil prepared according to the directions of Cennini and others is found in a short time to become yellow, and to be liable to the same changes as other oils.

ALLAN'S ELECTRO-MAGNETIC ENGINES.

The *Times* of December 26th contains an elaborate article on the employment of electro-magnetism as a motive power, in which it strongly advocates the merits of Mr. T. Allan's engines, which have on several occasions been brought to the notice of our readers. We do not think it desirable to reproduce the whole of this article, but think the following condensed remarks taken from it will be read with interest.

It is almost superfluous to enumerate the many important advantages which an electro-motive power has over steam. There is perfect safety from all danger from fire or explosion. There is no expenditure of materials when the engine is not in action, and its power can be applied at a moment's notice. It is always ready for action without previous consumption of materials in getting up steam; and in marine engines there would be no waste in freightage as for carrying coal. These are the most important of the advantages it offers, but many others will occur to any who reflect for a moment on the peculiar nature of the two forces employed. With such high rewards in view, plans to convert the power of electro-magnetism into a motive force have always been among the most cherished schemes of electricians. In a paper read before the Society of Arts in 1850, the improbability of any result being obtained from electro-magnetism which could enable it to compete with steam as a motive power was carried *nem. con.* Very recently at a discussion at the Institution of Civil Engineers it was even more unequivocally condemned, and declared that the power exhibited by electro-magnetism, though very great, extended through so small a space as to be practically useless, and that a powerful magnet might be compared to a steam engine with an enormous piston, but with an exceedingly short stroke — unquestionably a bad arrangement. Now, doubtless, from the points of view at which the inventions were regarded, these decisions were right. It is a certain fact that electro-magnetism never will supersede steam; and no electrician in his senses could really have entertained such an idea. But, although steam must be employed, electricity can find place as a motive power in many kinds of work where steam is now out of the question. The other objections have been, first, the cost of the power, and, second, the shortness of the space through which the power is exerted, or, in other words, the want of adequate stroke or motion in the force. The power of electricity, when applied in the form of an electro-magnet, is wonderfully great from comparatively small means; but its dynamic power decreases so rapidly through intervening space, being "inversely as some unascertained power of the distance much greater than the square," that the range of the *maximum* effect, or valuable portion of the motive force, with a consequent *minimum* of consumption, extends to so small a distance as to be of no real value in mechanics. The great problem to solve has been, to contrive such an arrangement of parts as to convert this *maximum* of the motive force through a range, although unavailable in itself, into stroke, or to give it such an extent of motion as to make it of practical value as a motive power. Mr. Allan's electro-motive engine has achieved many of these *desiderata*. He has utilized all his power—he has obtained length of stroke. By this invention the *maximum* portion only of the dynamic force is applied, and by the mechanical arrangement of parts successively and continuously brought into action in a direct form, in accordance with the laws of electro-dynamics. Thus applied there is no loss of the primary force, and any amount of power and any length of stroke can be obtained. In fact, both mechanical and electrical conditions are very simply and beautifully complied with; and to this alone is the success of the invention due.

The machine is here described in substantially the same terms as in the *Mechanics' Magazine*, Vol. lx. p. 265, and Vol. lxvi. p. 389.

As far as the first conditions of power and length of stroke are concerned, the machine appears to have achieved great ends. One has recently been submitted to the Emperor Napoleon and the Directors of the Conservatoire, as illustrating the first principles of the machine which, it is hoped, is to carry off the French national prize of £2,000, offered to any who can solve the question of

the practical utility of electricity as a motive power. The success of the competitor there is to be attested by the cheapness with which he can produce his power. According to the average price of coals in Paris, one horse steam power per hour can be obtained for 8 centimes. The average price of zinc is 80 centimes per kilogramme; and the French conditions for gaining the prize are, that the machine shall work one horse-power on an expenditure of not more than half a kilogramme of zinc, or at 40 centimes the hour. This would make the cost of the electro-motive power in Paris five times greater than that of steam; but the many advantages which, in other respects, it possesses over the latter power, would more than counterbalance this disadvantage. According to this rate, Mr. Allan's machines in England, where coal is cheaper, would work at a cost ten times greater than the present average price of steam; yet many of our first machinists and manufacturers say that the invention of electro-motive engines, at as much as eighteen times the cost for steam-power, will pay largely. Mr. Allan professes himself perfectly confident that he can produce a machine not only within the working price we have just mentioned, but even within the French conditions. He maintains that it is an error to consider the cost of electro-motive power as being relatively less "profitable" than steam; and that the error has arisen from the misapplication of the electro-magnetic force, not from the necessary consumption of the electric materials, which consumption is inversely as the dynamical ratios of the force. He considers that the materials, on the other hand, from their chymical admixture in the battery, although of no practical avail for the further production of the electric fluid, become when produced on a large scale of considerable market value, and when sold realize a large percentage of their original cost; but, as the cost of the power is thus taken as the standard of success, the expenditure, in fairness, must be regarded from various points of view; and more important questions must be decided ere the cost can be fairly ascertained. For instance, Mr. Allan finds that there must be a certain relation between the electric current and the diameter and length of the magnet; though what these conditions are it is difficult to say at present. With only a slight modification of the relation of the wire to his magnet, he suddenly found that he lost four-fifths of his power. Now, here is a problem the solution of which must have a vital influence on the electro-magnetic power and, therefore, on its cost of production. Yet, these disturbing influences, whatever they are, were not even known to exist until now; and every day the general laws which govern the science of electro-magnetism are becoming more and more fully developed. In a very able and impartial paper, which was read by Mr. Hunt before the Institution of Civil Engineers, many objections, all more or less sound, were urged against the availability of electricity as a motive force. We are certain, however, that that gentleman was ignorant of the principle upon which the machine of Mr. Allan is constructed: for a knowledge of it must have altered the conclusion to which he was then almost naturally led.

We do not pin our faith on one invention more than any other, and only dwell on Mr. Allan's as being furthest advanced in the path towards success. By his application of electro-magnetism, he has certainly made it a motive power valuable in mechanics. It only remains for him to obtain his electricity cheaply, though to do this we believe he must resort to other means than those hitherto employed—to means which every man of science, in speaking or writing on the subject, has gone round and round about without ever happening on what was really wanted. With the French we are inclined to the belief that such a power is attainable, and will, ere long, too, be attained. The new-born science, though still but little known, is gaining on us fast, and advancing with giant strides into the business of every-day life. It is but a few years since Sir Humphry Davy employed a thousand pair of zinc and copper plates to do the work which would now be better done with twelve of the same agents in a modern battery. What, then, may we not hope and expect from a series of scientific researches into the as yet undeveloped secrets of this marvellous element?

Paper Impervious to Water.—Take 24 oz. of alum, and 4 oz. of white soap, and dissolve them in 2 lbs. of water; into another vessel dissolve 2 oz. of gum arabic, and 6 oz. of glue in the same quantity of water as the former, and add the two solutions together, which is now to be kept warm, and the paper intended to be made waterproof dipped into it, passed between rollers, and dried; or without the use of rollers, the paper may be suspended until it is perfectly dripped, and then dried. The alum, soap, glue, and gum form a kind of artificial leather, which protects the surface of the paper from the action of water, and also renders it somewhat fireproof. This is a preparation for waterproofing paper intended for packages exposed to the weather, recommended by Professor Muschamp, of Wurtemburg, Germany.—*Scien. American.*

THE CORT TESTIMONIAL FUND.

Our object in publishing the following correspondence is to call attention to a want that is strongly felt in this country, viz., that of a suitable fund for the reward of meritorious inventors, and of a suitable body to administer such a fund. It will be seen from the letter of the Admiralty's Under Secretary to Mr. Cort, that the Admiralty avow they have no funds at their disposal from which they could grant a donation to a Fund which has received the countenance and patronage of the first practical and scientific men of the kingdom. This state of things ought not to exist all the time we are without some great general fund to the administrators of which inventors or their representatives can apply for suitable rewards. There cannot be a doubt as to the powerful claim of the Cort family upon the Government for the services set forth in Mr. Cort's petition; and it is hardly to be expected that the promoters of the Testimonial Fund will be content to let the matter remain as it now stands.

"To the Right Honorable the Lords Commissioners of the Admiralty. The Humble Petition of Richard Cort, of 16, Hemingford-terrace, Caledonian-road, London, soliciting a donation to the 'Cort Testimonial Fund,' sheweth:

"1. That the late Henry Cort invented and introduced, with much labour and expense, certain improvements in the manufacture of iron, which, according to all scientific and practical authorities, lie at the root of the present iron manufacture of Great Britain, and without which this nation must have depended exclusively upon foreign countries for supplies of that invaluable material.

"2. That although there are now about 8,200 of Henry Cort's patent furnaces in use in Great Britain, and although his inventions have been employed for the last sixty years, in the manufacture of every bar of iron, and every wrought-iron article used in Great Britain, yet neither he nor his family ever received more than a very trifling recompense.

"3. That the Board of Admiralty, existing at the time the inventions of Henry Cort were introduced, were among the first (after forty-eight trials of the patent iron, in all the royal dockyards, against the best Swedish iron) to recognise the extraordinary merits, and to avail themselves of the immense advantages, of those inventions.

"4. That the whole of the anchors, chain cables (first made by Henry Cort with British iron), cannon, steam engines and boilers, pumps, chain plates, and other wrought-iron articles, at present used in Her Majesty's ships, together with the iron gunboats, mortar floats, and floating batteries, are produced by means of Henry Cort's inventions, and without them could not be manufactured in this country at any reasonable cost, or with any excellence of quality.

"5. That the only surviving members of the family of Henry Cort are your petitioner and three necessitous sisters, all more than seventy years of age.

6. "That in consideration of the services of Henry Cort, and of the national advantages resulting therefrom, a public subscription fund, called the 'Cort Testimonial Fund,' has been opened on behalf of your petitioner and his three sisters, and subscriptions to the amount of £500 have been collected during the last two years from voluntary contributors, commencing with Her Most Gracious Majesty (through the kindness of Lord Palmerston), and including many distinguished persons and iron companies (as per paper hereunto annexed).

7. "That your petitioner therefore prays that your Lordships will aid him and his sisters—the immediate representatives of Henry Cort—by such a contribution to the above-mentioned fund as your Lordships may deem suitable.

"And your petitioner will ever pray, &c.

"Richard Cort.

"Dated December 10, 1857.

PAPER ANNEXED.

"Seventy years ago, Great Britain was almost entirely dependent upon Sweden and Russia for her supply of malleable iron, and seemed likely to continue so. At present the manufacture of this article is one of the most important branches of our national industry; whilst its exportation is one of the principal supports of our foreign commerce.

"We believe it to have been to the inventions of Henry Cort, patented in 1783 and 1784, that this extraordinary development of the iron manufacture is mainly due; since it was by him that the means were first devised of bringing pig iron into the malleable state by the flame of pit coal in the puddling-furnace, and that grooved and flat surface rollers were first employed for rolling the iron thus prepared into bars and plates, whereby the necessity for the employment of charcoal was superseded, and a superior iron was produced with one-twentieth part of the labour and cost previously expended in forging.

"No approximation to these inventions had been previously put in practice, and no essential improvement upon them has been subsequently introduced. In fact, every ton of bar iron produced in this country is

manufactured by means of puddling-furnaces and rolling-mills, constructed, as to every important particular, upon the model of those of Henry Cort.

"The actual money value of these inventions to the British nation has been recently estimated, by a competent and impartial authority (William Fairbairn, Esq., F.R.S., engineer, Manchester), as not less than six hundred millions sterling; and this is quite independent of the collateral advantages resulting from the development of every branch of manufacturing, agricultural, and commercial industry for which malleable iron is required.

"It does not seem too much to us to affirm, therefore, that scarcely any other individual has contributed in a more important measure to the material prosperity of this country, and that Henry Cort is entitled to a place in the foremost rank of national benefactors."

[Here follow the names of Lord Wrottesley, General Sabine, several professors, and a long array of the most eminent engineers and ironmasters of the day.]

"Admiralty, Dec. 11, 1857.

"Sir,—In return to your petition of the 10th inst., I am commanded by my Lords Commissioners of the Admiralty to acquaint you that they regret that they have no funds at their disposal from which they could grant a donation to the 'Cort Testimonial Fund.'

"I am, Sir,
"Your most obedient servant,
"W. G. Romaine.

"Richard Cort, Esq.,
"16, Hemingford-terrace,
"Caledonian-road, London."

16, Hemingford-terrace,
Caledonian-road, Islington,
December 17, 1857.

"To the Right Honourable the Lords Commissioners of the Admiralty, &c., &c.

"My Lords,—I beg to apprise your Lordships, that in reply to my petition to your honourable Board, dated the 10th December, soliciting a donation to the 'Cort Testimonial Fund,' I have received a letter dated the 11th December, signed W. G. Romaine, informing me, by your Lordships' command, that your Lordships regret you have no funds at your disposal from which you could grant a donation to the 'Cort Testimonial Fund.'

"I respectfully venture to express to your Lordships the surprise and regret occasioned me by this reply, and to bring to the notice of your honourable Board the following considerations:—

"1. The awards of money, to a large amount, which your Lordships have either made or recommended to be made to various inventors for the introduction and use of the *screw propeller* and other inventions, prove that your Lordships are able, as the Lords Commissioners of the Admiralty should be, to ensure the appropriation of money for the reward of meritorious inventions.

"2. It is established upon the testimony of the most eminent men in this country, that the inventions of Henry Cort surpass in value any other inventions of the last century; and your Lordships must be aware that inventions by which the manufacture of BAR IRON has been so vastly diminished in cost, improved, and extended, out of materials previously useless in our native land, must have contributed in a very great degree, not only to the wealth and power of the British nation, but to the security and efficiency of Her Majesty's Navy.

"3. It is also established upon the same testimony, that neither Henry Cort nor his children ever yet received even a tithe of the pecuniary benefit which should have come to him and them from his inventions; and it is not less certain that the British Government has never yet compensated him or them for those advantages of which the successive British Admiralty Boards, for more than half a century, have availed themselves, in the construction and equipment of Her Majesty's Navy.

"4. Neither should I omit to state that the voluntary contributions from the Royal Bounty Fund and many eminent individuals have been prompted by no other feeling than a grateful and benevolent sense of the unexampled services rendered by Henry Cort to the great interest over which your Lordships preside, and to the British nation generally.

"I therefore must humbly presume to request your Lordships to reconsider the petition which I have had the honour to address to you, and, should you deem the representatives of Henry Cort worthy of the slight service which alone is sought at your Lordships' hands, to take such steps as will enable your honourable Board to confer upon them some small acknowledgment of their father's deserts, before they, whose heads are already white with age, are laid low with him, beyond the reach of those honours and emoluments which are their just due.

"I have the honour to be,
"Most respectfully,
"Your Lordships'
"very obedient, humble servant.
"R. Cort."

[The preceding letter has not been in any way responded to by the Admiralty.]

TURNBULL'S HEAVING-UP CRADLES AND SLIDE-WAYS FOR SHIPS.

Mr. R. Turnbull, a foreman of shipwrights, of Harwich, has patented a set of improvements in ships' cradles and slide-ways, relating principally to a former invention, which was fully described at page 276 of our Magazine for Sept. 19, 1857, No. 1780; or, according to the present improvements, cradles may be specially adapted to the improved slips. The leading idea of the later invention appears to be identical with that of Mr. T. White's (of Portsmouth) invention; viz., that of first heaving the ship up longitudinal ways, and afterwards, by means of transverse subways, moving the ship transversely away from the heaving-up slip. For this purpose, he forms the cradle in detached sections, which are readily connected by means of sliding rods or temporary bars of iron, or pieces of timber, adjusted to permit a certain separation of the parts of the cradle, which he makes in lengths of ten or fifteen feet. The sections of the cradle are distributed at equal distances apart under the ship's bottom, and she is hove up on them as on an ordinary cradle. The frames or plates of the slip are divided into lengths, at distances according to the lengths of the sections of the cradle and the spaces between them. The alternate parts of the slip are arranged, the one series of parts on the solid ground, while the next is mounted on rollers, and supported on subways, or on hollows and rounds placed transversely to the heaving-up slip. When the vessel is hove up, the several sections of the cradle rest on the moveable frames or plates of the slip, and when in this position the vessel may be moved sideways away from the heaving-up slip. When so moved, the vessel is then shored up at those parts between the sections of the cradle; the connecting bars of the several sections or parts of the cradle may then be removed, and the cradle traversed transversely from under the vessel to its position on the heaving-up slip, in readiness to heave up another vessel.

THE LAUNCH OF THE "LEVIATHAN."

Tuesday, Dec. 29.

We still receive numerous suggestions respecting the launch of the "Leviathan;" but it is most likely that Mr. Brunel will complete it after his own fashion, whatever the cost may be. More than one correspondent expresses himself strongly in favour of an extended application of percussive forces to the cradle, and one of them (Mr. B. Cheverton) recommends the use of small charges of gunpowder applied in a certain manner to the cradles. For ourselves, we retain our first opinion, viz., that no more is necessary than to resort to the common greased wooden slides and cradles. A highly ingenious ship-builder, who writes under the signature "Nauticus" to the *Times* of this day, expresses the same opinion, but suggests a scheme for obtaining the wooden surfaces without turning out the cradles as we suggested in our last number. He proposes to apply (somehow) tapering sole pieces to the under sides of the cradles, one between each pair of rails, with its thin end towards the water, and to fill up the spaces below these sole pieces with corresponding tapering pieces attached to the slide ways. Then to remove the rails between the cradles and the water, and plank the ways over to meet the butts of the tapered pieces beneath the cradles. The ways being greased, and the ship once started, she would then launch herself in the ordinary manner. The writer has wholly forgotten, however, that the cradle has beneath it a number of thick projecting iron plates, to which it would be quite impossible to attach his thin tapering sole pieces. His scheme is therefore impracticable. We quite agree with "Nauticus" in believing that the foremost chain exerts "a fearful twisting stress" upon the fore part of the ship, and the after one a prejudicial strain upon the screw shaft.

Winder's Patent Submarine Structures.—Mr. R. Winder, of Dover, has obtained a patent for an invention which relates to a mode of simplifying the placing of large blocks of concrete or masonry to form the foundations of piers, harbours, &c. The patentee forms a floating caisson of plates of iron (open at the upper part), brings it over the spot which is to receive a block, and moors it there. He then places concrete therein, or builds up brick or stone work therein, as required; and, by the accumulation of such building materials in the vessel, the latter is sunk to a given depth in the water. He next builds up the sides of the vessel by adding plates of iron to the upper part, and thereby increases its capacity and depth, the upper edge of the vessel being raised considerably above the surface of the water. When this is effected he continues to throw in concrete or build up masonry within the vessel, repeating the building up of the outer iron casing as the vessel sinks by the accumulating weight placed in it. In this way the caisson is charged with masonry or concrete until it sinks to the bottom, where it will by its own weight remain immoveable, and form a secure artificial foundation for any subsequent superstructure. The casing of the cast iron will prevent the water from abrading the surface of the concrete.

Dr. A. L. Crelle's Rechentafeln ; or, The Multiplication Table up to 1,000 *times* 1,000. Berlin, 1857. George Reimer.

THE mechanical means by which the computer can be enabled to alleviate his tedious labour are few, and those few, in most cases, but of little avail. Up to the present time there has been nothing within the reach of the statistician which would serve him half as well in his laborious work as his own unassisted brain. Addition, the most toilsome labour of the arithmetician, not from its intrinsic difficulty, but from its constant recurrence and enormous length, and subtraction, his lightest task, we may leave out of the question. Their simplicity, and their endless variation, would render mechanical aids a hindrance instead of a help; but the more complicated operations of multiplication and division have during the last 250 years been felt as nuisances, which it was possible in a great measure to abate.

The first step of any importance was taken by Napier, of Merchistoun, who seems to have devoted his life to the discovery of some means of shortening these calculations. "Napier's bones," his first invention, proved a failure; but they were succeeded in 1614 by his logarithms, which, altered to a more convenient form by Henry Briggs, Savilian Professor at Oxford, are probably the greatest accession which the art of computation has received since the introduction of the Arabic notation. We need not enlarge upon this subject; it will be sufficient to point out that their main advantage in astronomy is derived from the circumstance, that the logarithm of a function is as compendiously tabulated and as easily referred to as the function itself. In cases where the same factors or divisors frequently recur, and in the extraction of roots, they also come in well, and they are thus useful to the actuary; but in isolated multiplications or divisions, it is as economical, and more accurate, to use the common arithmetic. The table of logarithms is therefore of little use to the statist or the merchant.

The next step in this matter was taken by Oughtred, whose invention of the *slide rule* was published in 1732 by his pupil, W. Forster. Its accuracy is, however, limited to two figures, or sometimes three, and hence, to the computer, it is only useful as a check. As such, its value is but little understood.

We may next allude to tables of quarter squares, which depend on the formula—

$$ab = \tfrac{1}{4}(a+b)^2 - \tfrac{1}{4}(a-b)^2$$

The only extensive tables of this kind with whose existence we are acquainted are those published in 1856 by Mr. Laundy. These extend to 100,000. They have their value in a certain class of work; but, as they are useless except for mere multiplication, they can have no very extended use. They will not even serve for division, without the help of a table of reciprocals.

The fourth scheme, and, in our opinion, the most useful to the common computer, whether statist, merchant, or mechanist, is the *extended multiplication table*. The most powerful and best arranged of these is the work cited at the head of this article.

Many of the older books, and among them the stereotype edition of "Callet's Logarithms," contain extended multiplication tables; but, with a few exceptions, they either stop short at 100×100 (which is far too little), or, if they go beyond the 100, they only include multiplication by a single digit. Such is Callet's table, above cited, which goes up to 9×10,000, and a more elaborate work by Dr. Crelle, published under the title of "Erleichterungs Tafeln," in which, by an ingenious, though complicated, arrangement, he has contrived to get the table up to 9×10,000,000, into an awkward quarto. But any practised computer will multiply by a single digit as fast as he can write the figures from right to left; and hence that elaborate work is utterly useless. Several tables have been published up to 100×1,000, and a French one up to 100×2,400; but they are all long since out of print, except perhaps one of Hutton's, which is said to be far from correct.

The first edition of Dr. Crelle's Rechentafeln was published in 1820, in two thick octavo volumes. It is not only out of print, but so extremely rare that a copy has several times been advertised for without success. It was therefore with great satisfaction that we heard of the publication of a new and stereotyped edition of this valuable work. We find it to be arranged in a more convenient form than the old edition, printed in a very pleasing and legible type, and published at a reasonable price—this last, perhaps, not the least recommendation.

The book contains all the multiples of every number up to 1,000, except the *tens*, two numbers with their multiples in each page (a foolscap folio), in a very lucid yet compendious form. Its operation will perhaps be best seen by taking an example and working it at length. Suppose we have 123,456 to multiply by 654,321, we proceed as follows, dividing each into periods of three figures,

	123,456
	654,321
321 times 456 is..........	146,376
321 „ 123 „	39,483
654 „ 456 „	298,224
654 „ 123 „	80,442
	80,779,853,376

If any one will call to his recollection the ordinary mode of performing this multiplication, and will bear in mind that the reference to this table is more rapidly made than to almost any table that we know, he will judge what the saving is.

We have also found it a great saving in division, especially in contracted division. Our own habit is, not to put down our products, but to do the multiplication and subtraction simultaneously; yet even so we have found a saving by the use of the table. Another easy way of performing division, if we are satisfied with half a dozen figures, is to use a table of reciprocals, and then multiply.

With considerable experience in statistical work, we have no hesitation in recommending this book, as a common ready reckoner, to all those persons who have many operations of a purely decimal character, no matter whether statists, actuaries, or merchants.

Prof. De Morgan, in his article on Tables, in the "Penny Cyclopædia," remarks on the early edition of Crelle:—"All who have used this table know how to dispense with logarithms in many cases to great advantage. There is no table which we so much desire to see reprinted in this country, with a few alterations which would render it more commodious.*

The book is at present published with an introduction in French and German. We understand that an English impression is being prepared, with an English introduction; but the truth is, that, to any intelligent clerk, the table explains itself.

Dr. Bremiker's name is a sufficient guarantee that nothing has been neglected to secure accuracy in its preparation and printing.

Influence of Solar Light on Combustion.—Dr. J. Le Coute, Professor of Natural Philosophy in South Carolina College, U.S., has recently published the results of researches made by him into the above subject, and concludes, that still further investigation is needed before the whole truth of the matter can be known; but, at the same time, states, 1st, that solar light does *not* seem to exercise any sensible influence on the process of combustion; and 2ndly, that variations in the density of the air *do* exert a striking effect, the rate of burning increasing (as might have been anticipated) with every increase in the density of the air.

* On reading some further notes of Mr. De Morgan on the same subject, we find that there was another table of multiples to 1000×1000 printed in 1610 at Munich, by J. G. Herwart. It appears to be extremely rare.

ON AN INSTRUMENT FOR CORRECTING THE MOON'S DISTANCE IN OBSERVATIONS FOR THE LONGITUDE.

BY GENERAL T. PERRONET THOMPSON, M.P.

To the Editors of the Mechanics' Magazine.

Gentlemen,—As your Magazine is a receptacle for everything connected with science and mechanical art, I take the liberty of submitting the following.

Of the two accredited methods of finding the longitude by observation, the time-piece has the advantage of determining the difference between neighbouring places with most accuracy; while the moon's distances are best adapted for settling the relative position of two remote points. A gentleman in Australia, with care and accuracy, might survey his estate with a time-piece; but if he is anxious to know the distance of any given point in it from the Observatory at Greenwich, he will do well to have recourse to lunar distances.

Everybody who has tried, knows it to be a very pleasant thing to take lunar observations, but a very unpleasant one to work them. And the consequence is, that, finding observations taken and never worked, the practice of taking is given up.

What is here wanted to be asked is, whether it would not be practicable to make an instrument, at the expense, perhaps, of a hundred pounds, or less, by which the correction of the lunar distance (which is the weary part of the process) might be performed mechanically with about the same trouble that the distance was collected with the sextant, and with equal if not greater accuracy. And if so, whether it would not be worth while for the Board of Longitude to construct such an instrument, and insert an invitation in the "Nautical Almanac" for all men to send their observations, and have them corrected for a trifling payment in advance.

The first thing clear is, that the problem might be solved on a celestial globe of increased dimensions, if means could be found for measuring arcs to a fraction of a minute, as is done upon the sextant. And it would be for instrument-makers to consider whether the end could be best obtained in some such way, or by constructing solid arcs, forming something like what may be exemplified on an armillary sphere. What would be wanted in this last case would be, that there should be two arcs of 90°, joined at their pole which represents the zenith, and capable of separation to an angle of 180°, and a third arc of 120° or rather more, any assigned portion of which could be applied to any assigned points in the other two, so as to form a spherical triangle,

And that all this should be capable of as much accuracy, by the application of *nonius* or otherwise, as in the instance of the sextant. To what extent it might be advantageous to increase the dimensions of the instrument, would be for the experienced instrument-maker to determine.

The process of what is called clearing the distances would then be reduced to the following:—Mark on the two arcs of 90° the apparent places in altitude of the two heavenly bodies or their centres, at the time of observation; separate the arcs till the distance of these places, as measured by the third arc, is as given by the observation. Find the true places by correcting the altitudes for refraction and parallax; and the distance of the true places, as measured again by application of the third arc, is the corrected distance. In applying the third arc, it would not be necessary to begin always from the same fixed point, for the distance can be collected differentially as well from another.

As a large portion of the observations supposed are made under circumstances of difficulty from various causes, it is important to cut down to a *minimum* the observations required on the spot. And here the first suggestion is, that the true altitudes of the two bodies whose distance is taken, might be estimated with sufficient accuracy on a celestial globe of large dimensions, the solar time being accurately known, and what a sailor would call the longitude by dead reckoning. And from these true altitudes the apparent might be inferred, by the contrary of the process employed to correct the apparent.

Nothing, in this part, appears to be positively required from the observer in Australia but the correct solar time, or observations leading to it, one essential of which is, the correct knowledge of the latitude of the place. After this, the times of the observation may be given from any watch with a second-hand, whose rate can be trusted for four-and-twenty hours.

For observations for latitude and for time by watch, nothing answers so well on shore as an altitude taken by reflection in water; for which purpose nothing is equal to a black japanned tea-tray, set a little slanting, and with a small allowance of water, the shallowness of the water causing rapid quiescence after any agitation by wind. But as this is only applicable to objects within 60° of the horizon, it is desirable to be acquainted with the starry heavens as the means of finding the latitude by observations of stars passing the meridian. The same star may conveniently be observed night after night, and the mean of results taken. For ascertaining the error of the sextant, the best way is to observe the sun or moon's diameter backwards and forwards and take the mean; or two stars within a short distance of each other will do as well. For finding the time by an altitude, the most favourable position, if nothing else interferes, is when the body observed is due east or west.

In taking the moon's distance, it is advisable to multiply observations of the distance to a moderate extent, and take the mean. Six observations, with intervals of not more than half a minute between each, will be found a good number. A pocket lantern with a reflector to throw out the light, is a good aid by night. It is better for the observer to get into the habit of doing all by himself, than be dependent on an assistant; it is easy to hold the watch in the hand during observation, and a second or two may be allowed for the delay in reading it.

When the distance can be observed from two bodies on different sides of the moon, it not only acts like any other multiplying of observations, but the mean result corrects the effects of an error in the correction of the sextant.

One good consequence of reducing the subsidiary observations to a minimum would be, that the observer might exhaust his energies in multiplying observations of the moon's distance. It is, of course, presumable that the distances, as corrected by authority, would include any difference between the moon's place in the "Nautical Almanac" and the true. With all these appliances, there would appear to be no difficulty in an observer in Australia sending home an observation of the moon's distance two or three times a week for a twelvemonth, and arriving at as exact a knowledge of the position of his establishment in respect of Greenwich, as if he measured it with a yard wand.

Yours very sincerely,
T. PERRONET THOMPSON.

Eliot Vale, Blackheath,
Dec. 29, 1857.

THE VICTORIA TUBULAR BRIDGE.—The first tube of this bridge over the St. Lawrence river, at the Montreal side, has just been placed in position. It weighs, we understand, nearly 1,000 tons, and when left to support itself was only deflected about 1½ inches. Calculations were made for a deflection of 4 inches, but the small depression is proof of its great strength. When finished, this will be the most gigantic structure of the kind in the world.—*Scientific American.*

MONSTER GUNS—HYDRAULIC RAMS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—In your impression of December 12th, Mr. Mallet claims "the right to priority" in the discovery of a method of making cylinders very much stronger than they could be made of any cast metal, or of a single piece of wrought metal, because he published it in June, 1855, and I did not do so till August. He cannot be aware that a patent dates from the day one takes Provisional Protection, and that mine is dated, February 27th, 1855. Does he mean to say that his publishing between my first and final specification gives him a claim to priority? Pray undeceive him.

Putting the patent aside, however, I doubt that mere priority of publication would give him any rights whatever, for the publication might have been mischievous, and I had been for nearly a year endeavouring quietly to get the subject investigated by the War Department. In September, 1854, I had an interview with the manager of some iron works for the purpose of getting a gun made on my plan, and on June 11th, 1855, a fortnight before Mr. Mallet's publication, had received a report of the Woolwich Committee on a gun absolutely made and tried! So much for Mr. Mallet's priority. As to Mr. Thierry's, I can only quote Mr. Mallet's own words from page 152 of his book:—

"Solid reinforce rings have been repeatedly proposed and frequently applied to various projects or forms of cannon, but the author believes that the peculiar advantages of their application in their concentric laminæ, the internal ones of which shall be compressed by an initial extension of the external ones, has never before been distinctly pointed out, and their adoption proposed and urged—*the essential and radical distinction* being this, that by no arrangement or variation of design can a gun be formed in a single ply of rings whose strength to sustain an internal pressure shall be greater than the cohesive power of the material per square inch of section, whereas by the subdivision of the rings into a number of super-imposed plies, each compressing those within it, the strength of the gun may be increased so as to bear an internal pressure, any required number of times greater than the ultimate cohesive powers of the material,—in fact may be increased *ad infinitum*."

Does Mr. Mallet mean that he used those words, "essential and radical distinction," on the 25th June, 1855, in a Pickwickian sense, or what does he mean by now saying that Captain Thierry proposed, in 1834, that which constitutes the "supposed novelty" of my invention in the very same letter in which he claims priority for its publication by himself in 1855? In August you said, in reviewing a pamphlet of mine, that Mr. Mallet had forestalled me on the 7th November. I wrote to you in consequence, stating my reasons for thinking Mr. Mallet's method of making cannon imperfect, although the one great principle involved was right. I did this that the failure I foresaw of the 36 inch mortars might not injure my patent. Yet Mr. Mallet sees, or affects to see, in my letter an "unhandsome" attempt to connect my name with his mortars. Truly, the French author was right who said, "*Les vertiges de la vanité conduisent bien loin.*" You have already published, page 439, November 7, an account of a trial of a 9-pounder I made against a cast-iron service gun, a brass service gun, and one made by Mr. Dundas, which, by the way, was exactly on Mr. Mallet's proposed plan, excepting the one "essential and radical distinction," which he cannot see between Mr Thierry's and mine, though I doubt not he can between Mr. Dundas's and his own. My gun stood 315 rounds, with 6 lbs. of powder and 2 shot more than Mr. Dundas's; 208 more than the cast-iron gun, and 144 more than the brass gun, and being then uninjured, was loaded to the muzzle and fired 158 times. The Lowmoor Company is prepared to make such guns at £32 a ton, and the government is experimenting whether they, or cast steel ones, at £200 a ton, are stronger. Is this what Mr. Howard calls a failure? I have read his practical letter to you, page 564, Dec. 12th, with much interest, and I trust he will not think it great presumption in me to endeavour to explain to him that the "refinements of theory" of Mr. Mallet and myself are not so very unnecessary.

Mr. Howard tells us that a bar of iron, stretched by about 10 tons per inch, stretches, without permanent injury, one-eighth of an inch in 10 feet; of course a bar 30 feet long will stretch three-eighths of an inch. If, therefore, we suspend a body weighing 30 tons by 3 bars, two of them 10 feet long, and one 30 feet long, they will stretch, and at the moment that they have lengthened one-eighth inch, the two short bars will be exerting a combined force of 20 tons, but the long one that of only 3⅓ ton (the strain due to a lengthening of one-eighth inch in 30 feet). This being insufficient to sustain the 30 ton weight, all will stretch further, and therefore the short bars, beyond their elastic force. Now in cannon as at present made, the circumference of the inside of the metal is to that of the outside near the breach, as

1 to 3, and stretches beyond its elastic power, when the outside would, on this account, be only strained one-third as much.

Nor is this all, for the interior lamina in lengthening in circumference diminishes in thickness, therefore presses less still on the outside than would cause a strain of even one-third its elasticity. Professor Barlow says, that the outer layer only takes one-ninth its share of work; I believe one-eighteenth would be nearer the mark in cast-iron, but cannot trespass on your space to enter into those calculations, which, by the way, none of us can do more than roughly approximate to, until we have more data.

If, instead of suspending the 30 ton weight by two bars of 10 feet and one of 30 feet, we had used two of 10 feet and one of $29\frac{3}{4}$ feet, when they had stretched each to their limit they would have suspended the weight without injury. This contains the essence of my scheme for guns, and of Mr. James Longridge's for hydraulic presses and guns. (He, too, is before Mr. Mallet, having taken a patent in May, 1855, and I think published.) A band of iron shrunk on at almost any heat will give great strength, but to obtain a strength of 20 or 30 tons per inch requires great nicety; and Mr. Howard's practical and ten times my more theoretical knowledge, must be combined, as in Mr. Longridge and Mr. Mallet, to carry such a plan out. Mr. Longridge has already made small cylinders to bear upwards of 20 tons per inch, yet the thickness of the metal only one-third the diameter of the bore.

The papers say that a cylinder of cast iron, $7\frac{1}{2}$ inches thick and 10 in diameter, burst the other day at the launch of the *Leviathan*. Can you corroborate, gentlemen, my calculation that a thickness of $6\frac{1}{4}$ inches would have been absolutely stronger, the outer diameter remaining the same?

Using Professor Barlow's formula,

$$\frac{r\,t}{r+t} \times s$$

for the strength, a glance will show us that it is maximum when r (radius) $=$ t (thickness of metal) valuing s—the cohesive strength of a square inch rod of cast iron—at 4 tons, we find the strength of a $12\frac{1}{2}$ inch cylinder with $6\frac{1}{4}$ inch sides to be

$$\frac{4 \times 6\frac{1}{4}^2}{12\frac{1}{2}} = 12\frac{1}{2}$$

tons per inch of length, which would counterbalance a pressure from within of 2 tons per inch. The strength of a 10-inch cylinder, with $7\frac{1}{2}$-inch sides would be

$$\frac{4 \times 7\frac{1}{2} \times 5}{12\frac{1}{2}} = 12$$

tons, allowing a pressure from within of $\frac{12}{5}$ or $2\frac{2}{5}$ tons per inch, but this would only act on 100 round inches of piston, whereas the larger piston would present a surface of $12\frac{1}{2}^2$ or $156\frac{1}{4}$ round inches. $156\frac{1}{4} \times 2 = 312\frac{1}{2}$ tons, the actual push the one ram could give, $100 \times 2\frac{2}{5} = 240$ tons, the actual push the other could give, though with a greater pressure on valves, &c., the quantity of metal being exactly equal in the two machines. Still more paradoxical does it seem, that by still further reducing the thickness of metal to about $3\frac{1}{10}$ inches, the diameter of the bore becoming $18\frac{8}{10}$ inches, although we reduce the absolute strength to $9\frac{8}{25}$ tons, not enough to bear a strain of even 1 ton per inch, we increase the pushing power of the machine to 350 tons, and still further spare the valves. A further reduction would decrease the pushing power, the maximum being when $r = t^2$. Surely, if theory tells us that a reduction of 60 per cent. in the thickness of our hydraulic presses diminishes the danger to valves and danger of leakage fully as much, to say nothing of expense, while it increases the power 46 per cent., a few experiments would reward any manufacturer making them.

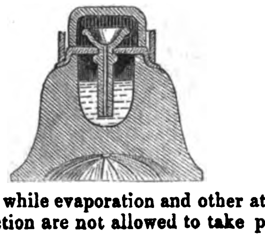
To return to Mr. Mallet—I wish it to be distinctly understood, that I think my having, without his knowledge, urged the Government to adopt the same plan—or I should say a plan based on the same general principle—for making guns which he afterwards urged, can in nowise injure his claims to the gratitude of the Government or the nation; nor even, if his particular method of carrying out the principle fails, as I believe it must, is he the less entitled to the credit of having independently made known a discovery of, I conceive, great importance. Pray accept my excuses for the great length at which I have entered into this subject.

I am, Gentlemen, yours, &c.,

T. A. Blakely.

HANCOCK'S PATENT SAFETY INKSTANDS.

Mr. F. L. Hancock has patented a safety inkstand, in which the ink is so effectually enclosed that the stand may be upset with



impunity, while evaporation and other atmospheric action are not allowed to take place

upon the ink. A section of the inkstand is represented in the annexed engraving. The ends desired are obtained by the use of a glass tube which passes down the centre of the inkstand, and is clasped below the dipping cup by an India-rubber diaphragm, the edge of which is tightly attached to the rim of the inkstand. A wooden rim surrounds the inkstand at the top. A slight pressure from the pen depresses the India-rubber, and thus causes the air beneath it to force ink up the glass tube into the dipping cup.

The improved inkstand has many advantages, and has no parts which are likely to get out of order. We recommend it to our readers as the best and cheapest we have seen.

PORTABLE GAS-HOLDER.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Having observed in the *Mechanics' Magazine* of last week a letter signed "Vulcan,"* in which he says that he wants a ready method of lighting a large house in the country, I think it may be well to state that, about three months ago, I contemplated taking a house about 500 yards from the main of gasworks, and consequently my attention was drawn to consider the best and cheapest method for supplying the necessary article.

I at first thought of fixing small gasworks; but, being connected with an establishment making several thousand cubic feet of gas daily, I had ample opportunity of ascertaining the cost and destruction of apparatus used in that establishment, and abandoned the idea of making the gas on my own premises, and intended to adopt the plan of which I have the honour of inclosing you a sketch.

Circumstances, however, have occurred which prevented my being able to try my plan, excepting on a very small scale.

On referring to the plans, fig. 1 represents the gas-holder mounted on a waggon with springs and four wheels. The bottom of the gas-holder is fixed to the framework with strong iron binders, passing under to prevent the shaking of the sheet-iron plates used in its construction. In order to reduce the quantity of water required for supplying the joints, the centre, B, is elevated so as to allow a sufficient space for the slides to pass freely when the gas-holder is empty.* A union joint is fixed to the pipe, A, for filling or connecting to mains.

Fig. 1.

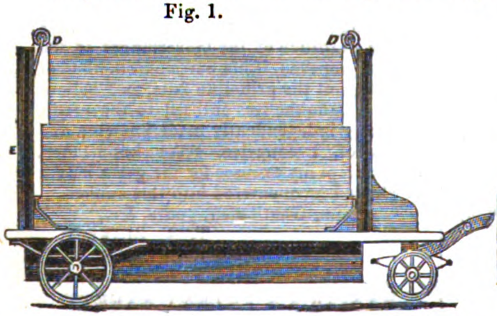
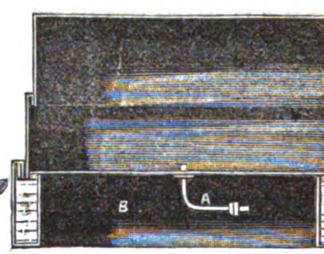


Fig. 2.



The section of gas-holder, fig. 2, is given to explain the principle of the water joints, C, and moved by the pulleys and weights, D, which work freely in tubes, E E, to prevent vibration on rough roads.

Having explained my apparatus in as clear a manner as I am able to your correspondent, perhaps he may see difficulties to be overcome. (In all apparatus there are always obstacles to combat.) For example, in case of a severe shake, the water might be displaced; and, should the above gas-holder be used for supplying the house as well as conveying the gas from the works in very hot and dry weather, the water would evaporate from the joints. To remedy the first difficulty, it would be only necessary to place a small barrel of water near the driver at F, from which he can have access at any time to repair such casualty; and in respect to the second, if the house is not supplied with tap-water, it will be necessary to elevate a cask filled from time to time with water, from which a self-acting supply will be always at hand.

* Will "Vulcan" send his address to us? We have a letter for him.—EDS. M.M.

* Is our correspondent acquainted with Mr. Malam's patent gas-holders, described at p. 170 of vol. lxi. of the *Mech. Mag.*, No. 1619?—EDS. M.M.

It is, I believe, an acknowledged fact that, up to the present time, no article has been brought for public use to supersede gas; and truly it may well be classed amongst the pleasures of life. I must, in conclusion, express the hope that the luxury will very soon be in every village; and, should the apparatus be properly carried out, there can be little doubt that every village and farmhouse can have gas delivered with as little difficulty as a load of coals.

I am, Gentlemen, yours, &c.,
G. Hart.

Dec. 24, 1857,
Lower York-street, Wakefield, Yorkshire.

THE ATOMIC ARRANGEMENT OF FLUIDS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—My diagram certainly was intended to represent the arrangement of atoms in a vertical plane; but why Mr. Carroll (who writes at page 565 of No. 1792) disapproves of this, I cannot say, as, if true of a single row, it is equally true of an entire fluid mass.

Your correspondent should remember that when considering the nature of water we have nothing to do with its component gases; they have, by their union, formed a new substance, every atom of which must be necessarily alike in a small quantity of it, unless we consider the almost inconceivable influence of gravity and lateral pressure, which, however, have great effect upon a large mass of water, as exemplified in the pressure exerted upon bodies let down into deep water. I quite agree with him that equal volumes of any two homogeneous fluids contain the same amount of matter,—it is self-evident; but this does not warrant us to conclude that the difference of gravity of any two fluids is due to a difference in the bulk of their respective atoms, such a conclusion being perfectly gratuitous.

The true cause I believe to be a difference in the density of their respective atoms, for I fully think that two bodies may be equally fine in fibre, be of the same size, and consequently of equal mass,—taking mass to signify "quantity" of matter, which I believe to be the correct meaning,—and yet differ much in weight, as I believe, from the different densities of their respective atoms.

I am, Gentlemen, yours, &c.,
J. A. D.*

* We insert the above letter at the particular request of the writer.—Eds. M.M.

PHOTOGRAPHIC AND STEREOSCOPIC PICTURES.

Mr. J. Purnell, photographer, of Barnsbury, has proposed the following improvements in apparatus for taking photographic pictures:—A bath for the exciting fluid is let into the bottom of the camera, and over this bath a clamp is suspended by a rod through the top of the camera. The prepared plate having been placed in the clamp, is lowered by the rod into the bath, and the picture is taken while it is still held by the clamp. Afterwards the hand of the operator is introduced through a sleeve into the camera, and the plate is removed from the clamp and placed in a drawer at the bottom of the camera, which is then closed by a slide, and the drawer is removed for the developing operation to be effected. For this purpose a cover is used, which fits on the top of the drawer, and is furnished with eye pieces glazed with yellow glass, to enable the operator to watch the operation. The bottom of the drawer is also of yellow glass. In the side of the cover is a pocket containing a bottle for the developing solution, which is now poured over the plate. When the developing of the picture is complete, water is poured over the plate through a trapped hole in the side of the cover, and allowed to run out by a valve at the bottom of the drawer. The picture is fixed in the ordinary manner. For taking stereoscopic pictures the inventor mounts the lens of the camera on a slide (as has heretofore been done for other purposes) and in taking the two pictures the lens is pushed first to one side and then to the other of the camera, so as to be opposite different parts of the plate; and to prevent the light falling on one side of the plate while the picture is being taken on the other side he employs a partition.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Piercy, F., and S. Flagg. *A portable expanding life and military boat, which is also adapted for other purposes.* Dated Apr. 7, 1857. (No. 981.)

This consists in forming boats that may be laid quite flat when not in use. The patentees construct them of boards of wood of a double thickness, one outside and another inside of a piece of waterproof flexible material. The bottom is flat and of a rigid piece. The sides are hinged to the bottom. The ends are each of three rigid pieces, one for either bow, united by a tapered middle piece. The parts are hinged together by the flexible material.

Bowley, R. K. *Certain improvements in*

boots and other similar coverings for the feet. Dated Apr. 8, 1857. (No. 984.)

This consists in the use of light coloured leather, enamelled, for the uppers of boots and shoes, and especially for the army and navy.

HINGLEY, B. and S. *Improvements in anchors.* Dated Apr. 8, 1857. (No. 985.)

This consists—1. In connecting the toggles of anchors with the arms, by inserting a peg on the toggle in a slot in the arm, and rivetting the same together. 2. In bending each end of the stocks of anchors at right angles to the stock.

SPARKE, J. B. and A. *Improvements in sawing machinery.* Dated Apr. 8, 1857. (No. 987.)

This invention was described and illustrated at p. 385, of No. 1785.

EDWARDS, E., and E. BEACHER. *Improvements in machinery or apparatus for washing or cleansing mineral and other substances.* Dated Apr. 8, 1857. (No. 989.)

This consists in arranging screens over or within vessels containing water; the substances to be cleansed are permitted to fall upon the screens, and the water is caused at each pulsation to rise and fall within the vessel, thus washing over the lighter substances, and allowing the heavier to fall to the bottom.

BRIGHT, C. T. *Improvements in laying down submarine telegraph cables, and in apparatuses to be employed therein.* Dated Apr. 8, 1857. (No. 990.)

This invention was described and illustrated at p. 505, of No. 1790.

NEWTON, A. V. *Improved machinery for cultivating land.* (A communication.) Dated Apr. 8, 1857. (No. 991.)

This relates to the cultivation of land by spades operated by locomotive power as the machine progresses in the field. The spades enter the land in succession, cut into it in the arc of a circle, suddenly throw up the cut slice against a shield plate, so as to reverse it, when it falls down thoroughly disintegrated.

ROGERS, J. W. *Improved means of, and apparatus for, collecting for use the excrement of towns and villages, and for facilitating the drainage of houses generally.* Dated Apr. 8, 1857. (No. 992.)

The patentee inserts in the existing sewers cast-iron air-tight pipes of any suitable capacity, and connects them with the pipes which lead from the houses. These air-tight pipes, called "house refuse mains," he leads to a large receptacle built near the mouth of the sewer. From this the liquid portions are filtered off into the river, and the solids left raised by a screw, and removed for use.

NEWTON, A. V. *Improved machinery for manufacturing coiled springs.* (A communication.) Dated Apr. 8, 1857. (No. 993.)

This consists chiefly in the combination with a rotating mandril (a single cone or frustum of a cone) of two or more pressing rollers, arranged so as to coil a piece of wire in a continuous series of truncated cones, having their bases in alternate opposite directions, to be afterwards severed from each other.

NEWTON, A. V. *Improvements in hand bullet moulds.* (A communication.) Dated Apr. 8, 1857. (No. 994.)

This consists—1. In constructing hand bullet moulds, so that they may be forced open against the adhesion of the lead to deliver the bullets, by the pressing together of the handles by the grasp of a single hand. 2. In combining with such a mould a cutter (operated by the opening of the mould) to cut the rag from the bullet, and to release the bullet from its matrix. 3. In a mode of combining with the mould a moveable core piece, which is placed within the matrix for casting hollow bullets.

OXLEY, W., and H. STRATH. *Improvements in lubricators.* Dated Apr. 9, 1857. (No. 998.)

This consists in a combination of parts for taking oil out of a vessel, and supplying it to the journal and bearing, or other article to be lubricated, and requires engravings to illustrate it.

MOLINEAUX, J. A. *Improvements in economizing heat in locomotive and other high-pressure steam engines.* Dated Apr. 9, 1857. (No. 999.)

This consists in heating the feed water on its passage from the tank to the boiler, by means of a portion of the exhaust steam, and in using the water obtained by condensation of the steam over again in the boiler. It requires engravings to illustrate it.

ROLFE, T. *Improvements in pianofortes.* Dated Apr. 9, 1857. (No. 1000.)

The object here is to prevent the vibration of the hammer after it has struck the strings. A piece or pieces of vulcanized India rubber, supported on the key or otherwise, is substituted in lieu of the elastic or yielding wire.

BIELEFELD, C. F. *Improvements in preparing the surfaces of slabs or sheets made of fibrous and cementing materials.* Dated Apr. 9, 1857. (No. 1004.)

The essential feature of the machinery required is, that rubbers of burr stone (or other material) should be caused to pass over the fibrous surfaces to be prepared, so that the lines of action may be constantly varying; and for this purpose the rubbing surfaces have a regular motion communicated to them, and the fibrous slabs or sheets have communicated to them a motion at right angles to the former motion.

TAYLOR, G. E. *An improvement in raising and shearing cloths.* Dated Apr. 9, 1857. (No. 1006.)

This consists in combining rotary or endless shearing machinery, with Kempe's patent raising machinery, wherein the cloths are raised on a bed arranged to admit of different widths of cloths being acted on at different times, and yet so as to protect the selvages in each case.

CLARK, W. *An improved instrument for indicating the pressure of steam.* (A communication.) Dated Apr. 9, 1857. (No. 1007.)

This is intended, besides indicating the pressure, to open an outlet at a given pressure for the escape of the compressed fluid, and also to cause this fluid in escaping to act on a whistle or bell, and thus make known that the maximum pressure has been exceeded.

TURNBULL, R. *Improvements in slips or ways for heaving up and moving ships, and in cradles for the same.* Dated Apr. 9, 1857. (No. 1008.)

This invention is described at page 8 of this Number.

LEACH, J. *Improvements in looms for weaving.* Dated Apr. 9, 1857. (No. 1010.)

This consists, 1st, in apparatus for shedding the warp. The patentee causes rollers to revolve and act within recesses formed in moveable plates. These recesses are so formed as to admit of a dwell or slower motion at certain periods,—as when the shuttle is being thrown. It refers also to the picking motion, and consists in the use of apparatus whereby the propelling force is applied parallel to that of the picker's motion.

BEECH, J., and J. WILLIAMS. *An improved mode of securing the rails of railways in their chairs.* Dated Apr. 9, 1857. (No. 1011.)

This relates to a mode of retaining the keys or wedges of railways in their place, by screwing the neighbouring ones together so as to force them in contrary directions. It applies particularly to the keying of the crossing rails in their chairs, but it admits also of a more extended application.

HADDAN, J. C. *Improvements in the manufacture of, and in the means of, and apparatus for, discharging projectiles.* Apr. 9, 1857. (No. 1012.)

This consists, 1st, in manufacturing projectiles with touch holes, or channels, for igniting the charge from the muzzle of a mortar or gun, by means of electric wires or fuses, inserted through such holes. 2nd, in discharging projectiles by aid of a single or double telescope, or sighting tube, fitted with legs, jointly with pointed surfaces of contact for resting in corresponding holes or notches in the gun, so that the legs or supports may be removed with the telescope from the gun, immediately before discharging it. 3rd, to the manufacture of projectiles, which consist jointly of a projectile and a wad, the projectile tapering towards the tail end, and the wad being readily separable from the projectile.

HADDAN, J. C. *An improvement or improvements in the smelting and refining of iron.* (A communication.) Dated Apr. 9, 1857. (No. 1013.)

This has reference to the direct production of malleable iron and steel from the ore without mixing with the ore any solid combustible, and consists in the use of a smelting furnace together with a refining furnace, in which the metal is refined by the passage of the air, steam, or gases through it whilst in a molten state, and in the further use of such furnaces, together with another furnace for generating gases, which pass through the refining furnace for reducing the oxides formed therein, and thence onwards and into the smelting furnace for reducing the ore.

SMITH, W. *A universal Jacquard apparatus.* (A communication.) Dated Apr. 11, 1857. (No. 1016.)

This invention cannot be described without engravings.

MATTHEWS, J. *A new or improved vat to be used in the manufacture of paper.* Dated Apr. 11, 1857. (No. 1019.)

The improved vat is so formed that the pulp passes from the upper part of the vat to the lifter, instead of passing from the middle or lower part as in the ordinary vat.

COURENQ, H. F. *Improvements in machinery for ruling paper.* Dated Apr. 11 1857. (No. 1020.)

This machine is composed of a frame bearing the axis of a cylinder, which is covered with blotting paper, and is furnished on one end with a groove in which passes a double endless cord, coming from a pulley on the axis of which is mounted a toothed wheel, which gears with a pinion fitted to the axis of a fly wheel put in motion by means of a treadle. The other end of the cylinder receives several large narrow discs of the same diameter as the cylinder, and having several projections which serve to raise the pens when they are not working. The pens are mounted on pen-holders which receive the inks as wanted. Endless cords take the sheets of paper when they are presented to the machine, and keep them whilst they receive the ruling. They are then brought by other cords behind the machine, where the ink dries. After this the same cords take the sheets on to a stand, where they form in packages.

BROOMAN, R. A. *Improvements in the distillation and rectification of spirits, in ap-*

paratuses employed therein, and in the preparation of the substances to be distilled. (A communication.) Dated Apr. 11, 1857. (No. 1024.)

This invention is related to others previously patented, and cannot be described without illustrations.

PENGELLY, T. N., and G. PORTER. *Improvements in the application of steam to lifting or hoisting coals and other goods from ships' holds.* Dated Apr. 11, 1857. (No. 1028.)

The patentees employ steam cylinders on a suitable frame. On the end of the piston rod and of the framework they mount sheaves. A rope or chain is rove round these sheaves; one end is fixed to the frame, and the other led over a suitable pulley, and hangs down the ship's hold. The goods to be lifted are attached to the fall. The steam being turned on elevates the goods.

WINDER, T. R. *An improved mode of constructing submarine works.* Dated Apr. 11, 1857. (No. 1030.)

This invention is described at page 8 of this Number.

GIMSON, J. *Improved apparatus for preventing the explosion of steam boilers.* Dated Apr. 11, 1857. (No. 1031.)

This apparatus is so contrived that when the level of the water sinks below a given point, an easily fusible plug or disc becomes exposed to the action of the steam, and will be melted thereby, and the steam allowed to escape, and signal the attendant. It is proposed to employ two of these fusible plugs or discs, one placed below the other.

ADCOCK, H. *Improvements in steam boilers.* Dated Apr. 11, 1857. (No. 1032.)

A boiler is, by diaphragms or partitions, divided into compartments, such diaphragms having openings through them for the passage of water and steam. Man holes are made into each compartment. The diaphragms are affixed by angle iron rings to the shell of the boiler and around the flues. To prevent bursting, and to prevent their being blown into the air when they do burst, the lower parts of the boilers are constructed of external cases, in which on the bursting taking place there will be produced a counteracting pressure.

MAURICE, J. *Certain improvements in the fastenings, fixings, and attachments used for supporting or securing artificial teeth in the mouth.* Dated Apr. 13, 1857. (No. 1035.)

This consists in applying a covering of India-rubber to such fastenings or fixings. This also protects the mouth from injury by contact with the side fastenings used.

RICHARDSON, T., and E. J. J. BROWELL. *Improvements in treating old or waste railway wood sleepers, and bearers, and in preparing or preserving wood for railway sleepers and bearers, and other works.* Dated Apr. 13, 1857. (No. 1036.)

This consists in subjecting old sleepers or bearers to dry distillation, to obtain tar, &c., therefrom, for preparing other wood. Also, in combining with tar used for preparing wood, a chemical solvent, such as caustic soda solution.

NEWTON, W. E. *Improvements in the construction of boats, buoys, floats, or other buoyant vessels.* (A communication.) Dated Apr. 13, 1857. (No. 1039.)

This consists in the use of gutta percha, or gutta percha mixed with glue, &c., and forming it in moulds, either so as to complete the boat or vessel at one pressure, and in one piece, or to prepare the air chambers, "timbers," thwarts, &c., separately, and then connect them simultaneously at one pressure, and in one operation.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

NEVILLE, W. *Improvements in amalgamating certain substances for the productio of fuel.* Dated Apr. 7, 1857. (No. 969.)

The inventor proposes to grind the article called culm, whether anthracite or bituminous, and to mix the same with clay, or other argilaceous substance.

ROTHWELL, J., and S. D. COOPER. *Improvements in breech-loading fire-arms.* Dated Apr. 7, 1857. (No. 971.)

This consists in forming upon the breech end of the gun barrel, in a position eccentric thereto, a short boss bored out larger than the barrel, and having its bore threaded to receive a screw, formed on one end of a circular block or breech, the other end of which has a similar screw taking into a nut attached to the stock or carriage. The circular block has a hole equal in diameter to that of the ball or cartridge to be used, and so situated eccentrically as regards the block as to admit of being carried by the partial revolution thereof either into a position coinciding with the bore of the barrel, or so that the solid part of the block may come opposite to and close the end of the bore.

DEARDEN, H. *Certain improvements in power looms for weaving.* Dated Apr. 7, 1857. (No. 975.)

This is designed as a substitute for the "check straps" employed in looms for diminishing the concussion of the shuttle and picker. The apparatus consists of a cylinder, within which is a spiral spring, exerting an outward pressure upon a plunger, one end of which presses against a lever extend-

ing to the spindle of the shuttle-box, so that as the picker strikes against the lever it will force in the rod and compress the spring, and thus offer a yielding check to the picker and shuttle.

COCHRANE, C. *An improvement in the heating of the blast for blast furnaces.* Dated Apr. 7, 1857. (No. 978.)

This consists in re-heating, by the direct action of a fire, an ordinary heated blast before it is allowed to pass into the furnace.

TAYLOR, B. *An improved arrangement of combined bed and utensil for the use of invalids.* Dated Apr. 8, 1857. (No. 982.)

This consists in the application to a bed of a funnel, or pan, which, passing downward through the mattrass, terminates above a vessel placed in a box beneath the framing of the bed.

BILLING, M. *An improvement or improvements in the manufacture of metallic cornice ends.* Dated Apr. 8, 1857. (No. 986.)

This consists in manufacturing "drop ends," by stamping the same out of sheet metal, the whole design being made in one piece.

FRANCIS, A. *Improvements in fastening shutters and doors.* Dated Apr. 8, 1857. (No. 988.)

The inventor arranges the shutters and doors to slide in the jambs, and applies against such jambs sliding abutments acted upon by springs, so that they have a tendency to pass into grooves on the inside or edge of such shutters, &c., to retain them from being opened from the exterior when closed.

BETHUNE, D. *Improvements in apparatus for preventing or consuming smoke in chimneys and furnaces.* Dated Apr. 8, 1857. (No. 995.)

The inventor conducts the air through hollow grate bars (from front to back), and thence through an opening in the bridge into the flue, where it comes into contact with the gases from the fuel on the grate.

BROOKS, E. *Improvements in the manufacture of fire-arms.* Dated Apr. 9, 1857. (No. 996.)

This consists—1. In the following method of manufacturing twisted barrels. The iron rod is coiled upon a mandril into a helical form; and the helix, after having been raised to a welding heat, is placed upon a die having a semi-cylindrical groove in it, with a stop at one end. A roller having a similar groove is passed over the heated helix in the die, passing from the open to the stopped end of the groove. The edges of the coiled rod are thus welded together. A steel tube may be welded in the interior of the coil, if thought desirable. 2. In a method of manufacturing the parts used to connect the barrel with the stock.

HARLAND, J. *Purifying plastic clay used for the making of all kinds of earthenware, and for the cheaper and more expeditious manufacture of bricks, tiles, draining pipes, and other articles of clay of a similar nature or description.* Dated Apr. 9, 1857. (No. 997.)

Here the clay is contained in a travelling box running on anti-friction rollers, and impelled by a rack and pinion, for forcing the body of clay against the dies or bars employed for shaping it. The lid of this box is fitted in grooves, in which it slides. As the box moves forward the front edge of the lid comes in contact with the bars or dies, and is arrested, whilst the box with the clay travels onwards, and forces the clay through the moulding dies. A reduction of friction is thus obtained, as the mass of clay never rubs against the sides of the box. The purifying of the clay is accomplished by forcing it through a grating in the lid of the box, or at the end thereof.

KYNASTON, A. F. *Securing and disconnecting ships' boats and towing cables.* Dated Apr. 9, 1857. (No. 1001.)

This invention was described and illustrated at p. 54 of No. 1771.

THOMPSON, H., and H. WALMSLEY. *Improvements in looms for weaving.* Dated Apr. 9, 1857. (No. 1002.)

This relates to pickers. The frame of the picker is of metal, and has arrangements provided to receive pieces of hide or other material at those parts subject to friction and the shock of the shuttle.

ALEXANDER, E. P. *Improvements in the manufacture of fulminating powder.* (A communication.) Dated Apr. 9, 1857. (No. 1003.)

This consists in the employment of amorphous phosphorus, mixed either with salt of lead, baryta, strontium, soda, potash, tin, or zinc.

PURNELL, J. *Improvements in apparatus for taking photographic pictures.* Dated Apr. 9, 1857. (No. 1005.)

This invention is described at page 15 of this Number.

ARMITAGE, W., and H. 'LEA. *Certain improvements in the manufacture of iron.* Dated Apr. 9, 1857. (No. 1009.)

It is usual in the manufacture of iron, in order to assist the refining thereof, to submit the iron, when heated, to the action of a hammer upon an anvil. The inventors bring a current of air, mixed with steam, into contact with the metal while it is under the hammer.

HADDAN, J. C. *Improvements in the manufacture of iron and steel.* Dated Apr. 11, 1857. (No. 1014.)

This has reference to the application of combustible or other gases employed in the

reduction of metal, such as hydrogen, oxide of carbon, carburetted hydrogen, &c., for the decomposition of the phosphurets, sulphurets, and oxides of iron; and also for the decomposition of certain combinations of nitrogen and iron, which are formed when molten iron is treated by passing atmospheric air through it.

BUNKER, C. J. *An improved life-preserver, or life-preserving shirt or sack.* Dated Apr. 11, 1857. (No. 1015.)

This consists of an article of dress, such as a shirt or chemise, so made of a waterproof material as to admit of being inflated, and of thus serving as a life-preserver in the water.

MARROW, J. *Improvements in machinery or apparatus for manufacturing bolts, rivets, nuts, and other similar forgings.* Dated Apr. 11, 1857. (No. 1017.)

This invention was described and illustrated at p. 433 of No. 1761.

SMITH, C. *An apparatus to be used in connection with certain domestic utensils.* Dated Apr. 11, 1857. (No. 1018.)

This consists in providing chamber utensils with a cover, furnished with an air-tight concavity or flexible lip passing round the peripheries of the same, so as to hermetically close the vessel and improve its appearance.

LHERITIER, S. D. *Certain improvements in signals.* Dated Apr. 11, 1857. (No. 1021.)

This consists of an arrangement of machinery by means of which a vessel called a clepsydra, partly formed of glass, is attached to a post on a line of railway, and, being half filled with a coloured liquid, is caused, upon the passing of a train, or otherwise, to reverse its position, the presence or absence of the coloured liquid in front of a light indicating danger or safety, as the case may be.

ROBINSON, J. B. *Improvements in machinery or apparatus for effecting agricultural operations.* (A communication.) Dated Apr. 11, 1857. (No. 1022.)

This consists in an ordinary locomotive boiler attached to a light metal frame-work on wheels. The main supporting wheels revolve loosely, and a shaft passes through a hollow axle, and is connected at each end and outside the frame-work by means of cranks and side rods to steam-engines placed on the top of the boiler, and this shaft is also connected to the digging cylinder by the same means.

ENGLAND, J. *Improvements in machinery for washing and wringing woven fabrics, and similar articles.* Dated Apr. 11, 1857. (No. 1023.)

This consists—1. In the application of the pressure of a spring or springs to frames placed in washing machines. 2. In obtaining the rubbing action on the fabrics by means of a washing frame, either fitted with rollers, grooved, or plain, in combination with two parallel frames, and moved between them. 3. In the use of a connecting rod, in combination with a crank and guide, to give motion to the washing frame. 4. In the use of a crank wheel and connecting rod when a wringing machine is used in combination with the washing machine, in order to work the washing machine.

LEJARD, F. D. *An improved safety apparatus to be applied to the triggers of firearms.* Dated Apr. 11, 1857. (No. 1025.)

This consists in the employment of a spring, which engages in a groove in the rear of the body of the trigger, and holds the trigger tight until released, when in the act of firing, by drawing back a bolt in front of the trigger guard, which pushes back the spring catch, disengages it from the body of the trigger, and allows the trigger to act in the ordinary manner.

WILES, W. G. *Improvements in brewing.* Dated Apr. 11, 1857. (No. 1026.)

This consists in boiling in a batch heated by steam pipes placed horizontally, as near the bottom as practicable. The steam pipes may be raised to a height above the bottom, and in placing over these pipes a perforated false bottom, from which there rises a perforated pipe. The liquor, being heated to boiling between the two bottoms, becomes expanded, and being unable to pass sufficiently rapidly through the perforations in the false bottom, rushes up the pipe, and then falls through the holes in this pipe, washing the hops and extracting all the valuable particles, but rejecting the coarse and resinous constituents.

WILTON, T., and J. HUGGETT. *An apparatus for regulating the flow or supply of gas.* Dated Apr. 11, 1857. (No. 1027.)

This invention was described and illustrated at page 409 of No. 1786.

JOHNS, C. S. *Improvements in preparing pulp for the manufacture of paper.* Dated Apr. 11, 1857. (No. 1029.)

One arrangement of the apparatus employed here consists of a double iron vessel, the outer vessel serving as a jacket to confine steam by which the inner is heated. Straw is placed in the inner vessel, which is then filled up with caustic alkaline liquor, and kept full by a force pump. The steam admitted between the vessels is caused to circulate rapidly.

PASCAL, J. B. *Improvements in electric lamps.* Dated Apr. 11, 1857. (No. 1033.)

This relates to electric lamps, in which are employed two currents of electricity,—the main current to the electrodes, and a

secondary one to keep the electrodes in proper relative positions. The upper electrode is fixed, while the lower one is supported from a float resting in a cylinder of mercury, which is in connexion with another cylinder of mercury at the same level. The upper part of this second mercury cylinder is in communication by a bent pipe with a vessel containing acidulated water, in which the wires of the second battery terminate. The primary current passes through the coil of an electro-magnet, which attracts an armature placed in the circuit of the second battery, which it breaks when it advances to the magnet, but again makes on receding therefrom by the force of a spring. Supposing the space between the electrodes to increase the light, the strength of the primary current will diminish, and cause the electro-magnet to drop the armature, which immediately establishes the current of the second battery, which decomposes the acidulated water, and generates gas, which passes over and presses on the mercury in the cylinder, and forces a part of it into the cylinder supporting the electrode, which is thus raised, thereby renewing the strength of the primary current augmenting the light, and again breaking the circuit of the secondary current to prevent the further generation of the gas.

PROVISIONAL PROTECTIONS.

Dated August 20, 1857.

2213. George Spill, of Stepney-green, manufacturer. Improvements in treating fabrics employed in the manufacture of hats, caps, and bonnets, and for other purposes, and also other fabrics, so as to render the same impervious to moisture and grease.

Dated October 19, 1857.

2668. Marcelin François Cavalerie, of Paris. Improvements in obtaining motive power, and in the apparatus connected therewith.

Dated October 21, 1857.

2687. John B. Slawson, of New Orleans, U.S. An improvement in boxes for receiving the fares of passengers in public conveyances, for the prevention of fraud on the part of the persons authorised to attend to the receiving of the fares as well as on the part of the passengers. A communication.

Dated November 24, 1857.

2935. Emmanuel Octave Bordas, eldest, of Bond-street, Piccadilly, agent. An improvement in billiard cues. A communication.

Dated November 27, 1857.

2958. Samuel Barlow Wright and Henry Thomas Green, of Rugby. Improvements in apparatus used in the manufacture of bricks, pipes, and tiles.

Dated November 28, 1857.

2962. Jules Peters, of Eupen, Prussia. Certain improvements in the machinery used in spinning.

Dated December 1, 1857.

2986. Thomas Jefferson Thompson, of Green wood-park, Newry, Ireland, mechanical engineer. Improvements in apparatus for lighting railway trains with gas.

Dated December 8, 1857.

3042. Thomas William Willett, of Chancery-lane, civil engineer. Improvements in the manufacture of gunpowder and in the machinery connected therewith.

Dated December 9, 1857.

3043. Charles De Bergue, of Dowgate-hill, city, engineer. An improved mode or modes of blowing, feeding, or introducing air into furnaces or other fire-places.

3044. Samuel Clarke, of Albany-street, Regent's-park. An improvement in wicks for candles and night-lights.

3046. Joseph Smith, Inspector of Permanent Way of the South Staffordshire Railway Co., of Walsall. Certain improvements in securing rails in their respective chairs for railroad permanent ways.

3047. John Haddon, screw manufacturer, of Birmingham. Certain improvements in the manufacture of wood screws, a portion of which is also applicable in the manufacturing of certain descriptions of nails.

3048. William Riddle, of Stonefield-terrace, Liverpool-road. Improvements in steam engines.

Dated December 10, 1857.

3049. James Hoddell, of Northampton-square, Clerkenwell, watch manufacturer. An improvement in watches.

3051. Guillaume Ther-Katz, of Paris, merchant. An improved registering and controlling apparatus for hackney-coach and other public carriages.

3052. Isaac Arrowsmith Best, of Birmingham, surgical mechanist. A new or improved mode of manufacturing printing types.

3053. Samuel and Joshua Biggin, of Sheffield, whitemetal smiths. Improvements in the construction of the handles of tea and coffee pots and other similar articles.

Dated December 11, 1857.

3054. John Chadwick, of Manchester, silk manufacturer, and Arthur Elliott, of West Houghton, Lancaster, mechanic. Improvements in machinery for spinning, doubling, and throwing silk.

3055. Joseph Tanton, of Frederick-street, Caledonian-road, veterinary surgeon. Improvements in shepherds' crooks.

3057. John Stather, of Hull, printer. Improvements in producing surfaces in imitation of wood for printing from.

3058. William Denne, of Bedford, surgeon. Improvements in apparatus used for lifting patients off beds and other surfaces used for reclining upon.

3059. Nathaniel Richard Hall, of Northfleet, Kent. An apparatus for registering the phases and age of the moon.

3060. Julius Roberts, of St. Leonard's Iron Works, Poplar, Captain, and Miles Beale, of Surrey-street, Strand, navy agent. Improved machinery for obtaining and applying motive power, applicable chiefly to the working of ships' pumps and other mechanism on ship board.

Dated December 12, 1857.

3061. James Parker, of Grove-terrace, Sydenham, solicitor's clerk. A novel application of steam power for the movement of vessels or other bodies floating on, or suspended in water air, or other fluid, and for moving machinery and propelling solid bodies on land.

3062. Frederick Walton, of Haughton Dale

Mills, near Manchester, card manufacturer. Improvements in the manufacture of rollers used in machinery for preparing and spinning fibrous materials and for other purposes where elastic pressure is required, also in the machinery employed in the manufacture of the said rollers.

3063. Francis Puls, of Haverstock-hill, chemist. A new combination of mineral substances for the production of artificial stone.

3064. William Uren, of Redruth, Cornwall. Improvements in machinery for cleaning and dressing minerals.

3065. John de Normann, of the Two Sicilies, Naples, and William Thomas Henly, of St. John-street-road, London, telegraph engineers. Improvements in machinery for preventing the overlapping of chains or ropes when used on drums or shafts, which improvements can be applied to the laying of telegraphic cables.

3066. Charles Cowper, of Southampton-buildings, Chancery-lane. Improvements in photography. A communication from T. de Beauregard, of Paris.

3067. Jean Marie Préaud, of Chancery-lane, civil engineer. An improved engine with rotary piston applicable to various purposes. A communication.

3068. Henry Duncan Preston Cunningham, of Bury, Hants, esquire. Improvements in reefing and furling sails.

Dated December 14, 1857.

3069. John Oldfield, of Haughton, Lancaster, engineer. Improvements in machinery or apparatus for cutting and separating fur, or hair, or wool, from hides or skins, which said improvements are also applicable to cutting vegetable or fibrous materials.

3070. Horatio Bunting, of Colchester, Essex, seed grower. Improved apparatus for obtaining and applying motive power.

3071. Jean Pierre Brignon, of Paris. Certain improvements in forging.

3072. William Little, of Queen's-road, Regent's-park, gentleman. Improvements in lamps.

3073. Joseph Parker, of Liverpool, gentleman. Certain improvements in the construction of bedsteads.

3074. Adam Baird, of Finchett House, near Liverpool, merchant. Improvements in regulating the supply of water and other fluids for domestic and other purposes.

Dated December 15, 1857.

3075. James Hogg, jun., publisher, of Edinburgh. An improvement in the manufacture of "copying paper."

3076. William Smith, of Salisbury-street, Adelphi. Improvements in chromotypographical printing presses. A communication from A. E. Rochette, of Vannes.

3077. Edgar Breffit, of King William-street, City, glass manufacturer. Improvements in the manufacture of glass bottles.

3078. John Bradley, of Huddersfield, ironmonger. Improvements in ovens applicable for baking bread and pastry, roasting or cooking meats, and similar purposes.

3079. James Chadwick, of Castleton Print Works, near Rochdale, manager. Improvements in rollers or cylinders for printing or staining the surfaces of woven fabrics, yarns, paper, and other materials.

3080. Edwin Turner, of Bradford, York, ironmaster, and John Charles Pearce, of Bowling, near Bradford, engineer. Improvements in the manufacture of railway wheels.

3081. Francis Bedwell, of Bath. Improved means of communicating between the passengers and guard, and the guard and engine driver, upon railways.

3082. George Tomlinson Bousfield, of Loughborough-park, Brixton. Improvements in the manufacture of cast steel. A communication from Dr. Mason, of Bilboa.

3083. William and John Galloway, of Manchester, engineers. Improvements in hydraulic presses.

3084. Thomas Howard, of the King and Queen Iron Works, Rotherhithe, engineer. Improvements in machinery or apparatus for rolling iron bars used in the construction of suspension bridges and otherwise.

3085. George Allen Everitt, of Birmingham, manufacturer. Improvements in the manufacture of tubes or cylinders of copper or alloys of copper.

Dated December 16, 1857.

3087. James Green Gibson, of Cheetham, Manchester, machinist, and Samuel Berrisford, of Stockport, Cheshire, machine maker. Improvements in looms for weaving, parts of which improvements are applicable to lubricating bearings generally.

3089. John Marland, of Fernlee Vale, Saddleworth, York. Improvements in apparatus to facilitate the placing of cop tubes on to spindles.

3091. Edwin Hills, of Warsash, Southampton, merchant. Improvements in the manufacture of white lead, and in the working up of the waste materials.

3093. James Hill Dickson, of Stanley-terrace, Rotherhithe, manufacturer. Improvements in machinery or apparatus for scutching and hackling flax, hemp, and other similar fibrous materials.

PATENTS APPLIED FOR WITH COMPLETE SPECIFICATIONS.

3100. John Everard Barton, of Kidderminster, carpet manufacturer. An improvement in winding worsted on to the creel bobbins of carpet looms. Dated Dec. 17, 1857.

3103. James Broad, coach spring and carriage lamp maker, of Drury-lane. The construction of a pressure or fountain lamp, to burn with safety from ignition in the overflow and from explosion all bituminous, carbonaceous, and resinous oils, spirits, and naphthas, or admixtures thereof, also the products of Rangoon earth oil, or petroleum; also to adapt all pressure and fountain lamps to burn these substances which are found to ignite in the overflow and cause explosion, &c., in all such lamps as at present constructed. Dated Dec. 17, 1857.

3111. Samuel Darling, of Maine, United States. An improved pencil sharpener. Partly a communication from J. W. Strange. Dated Dec. 18, 1857.

3112. Charles Winslow, of Massachusetts, United States. An improvement in the manufacture of "elastic gore cloth." Dated Dec. 18, 1857.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," December* 29, 1857.)

2193. W. Young. Improvements in fire-places or stoves.

2197. A. Wall. Improvements in amalgamating metals.

2198. A. Wall. Improvements in coating metallic surfaces.

2206. R. C. Gist. Improvements in the manufacture of manure. A communication.

2209. R. L. Brooke. Improved method for discharging, paying out, and submerging electric telegraph cables, wires, or ropes, or such like articles, from ships or vessels of any description.

2212. R. A. Brooman. A new method of defecating sugar and other saccharine matters and of refining or rectifying alcohol. A communication.

2214. A. P. Chamberlain. Improvements in machines for cutting corks and other substances.

2217. T. Ingram. Improvements in railway brakes.
2220. J. McMaster and W. Wilson. Manufacturing liquid farm manure, and rendering it as efficient as any artificial manure, at a small expense to the farmer.
2221. V. H. Laurent. A new improved machine for forging nails and other similar articles.
2222. P. Ashcroft. Alarm signals for the prevention of accidents on railways.
2226. H. Clarke. Improvements in the lines of steam vessels, and in the method of propelling the same.
2233. L. Levison. Improvements in mechanical purchases to be employed for hoisting purposes, and for extracting roots and stumps of trees. A communication.
2234. P. G. Gardiner. A new and useful process in the treatment of cast steel while passing from the molten state into that of being hardened or tempered, and which, with certain variations, is applicable to the making of tools, instruments, axes, wheels, or ingots.
2239. A. Hamilton. Improvements in the construction of and in mooring buoys, beacons, floating lights, and other floating vessels and bodies.
2241. T. Macauley. Improvements in apparatus for condensing the noxious vapours arising from varnish-making and other like manufactures.
2255. P. Hill and J. Moore. Certain improvements in machinery or apparatus for cutting velvets or other similar piled fabrics.
2262. A. V. Newton. Improved means of operating slide valves for the induction and eduction of steam in reciprocating steam engines. A communication.
2280. J. A. Chartier. Certain improvements in steam engines.
2284. W. Clark. Improvements in the application of portable rails or ways to vehicles. A communication.
2285. H. Brinsmead. An improvement in the beaters of thrashing machines.
2290. E. Leigh. Improvements in constructing certain parts of machinery or apparatus used in preparing and spinning cotton and other fibrous substances.
2301. T. W. Roys. Improved apparatus applicable to the capture of whales and other purposes.
2427. Sir J. C. Anderson. Improvements in locomotives and other carriages.
2472. T. Saunders. An improved tumbler key and lever tumbler lock.
2530. G. W. Shibles. Improvements in arranging and reefing the sails of ships.
2728. J. E. F. Luedeke. A new or improved motive power engine.
2769. R. Martin, E. Hall, and J. Hall. Improvements in steam hammers.
2896. P. Bettle. An improvement in the construction of watches.
2984. R. Hipkiss and W. Olsen. Improvements in lubricating shafts and axles and other articles requiring lubrication.
2987. E. C. Shepard. Improvements in magneto-electric machines.
2995. J. Francis and C. Manby. Improvements in the manufacture of waggons and other vehicles applicable to the transport of troops and military and other stores on land and water.
2996. A. and H. Parkes. Improvements in the manufacture of sheathing metals.
3010. J. d'Helle and A. de Waresquiel. Improvements in railway rolling stock.
3044. S. Clarke. An improvement in wicks for candles and nightlights.
3073. J. Parker. Certain improvements in the construction of bedsteads.
3103. J. Broad. The construction of a pressure or fountain lamp, to burn with safety from ignition in the overflow, and from explosion, all bituminous, carbonaceous, and resinous oils, spirits, and naphthas, or admixtures thereof, also the products of Rangoon earth oil, or petroleum; also to adapt all pressure and fountain lamps to burn these substances which are found to ignite in the overflow and cause explosion, &c., in all such lamps as at present constructed.
3111. S. Darling. An improved pencil sharpener. Partly a communication.
3112. C. Winslow. An improvement in the manufacture of "elastic gore cloth."

Opposition can be entered to the granting of a Patent to any of the parties in the above List who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

1854.
2724. Frederick Samson Thomas and William Evans Tilley.
2741. John Gray.
2742. Gerd Jacob Benson.

1855.
5. Stephen Giles.
8. Henri Louis Dormoy.

LIST OF SEALED PATENTS.

Sealed December 22, 1857.

1819. John Forster Meakin.
1829. Andrew Spottiswoode.
1830. William Pole.
1849. William Rowan.
1850. William Rowan.
1862. John Agar and William Agar.
1905. Charles Patrick Stewart and David Graham Hope.
1923. John Gill.
1944. Peter Rector Smith.
1976. Guillaume Defis.
1987. Samuel Ramsden.
2227. Henry Hodges.
2500. Stephen Smith.
2623. Edward Keighley.
2647. Richard Wright.
2739. Elizabeth McDowall.

Sealed December 23, 1857.

1814. Narcisse Laurent.
1817. Juan Pattison.
1818. James Lawrence.
1821. John Lyon Field and Charles Humfrey, Jun.
1824. John Talbot Pitman.
1826. Isidore Charles Cloet.
1827. William Parsons.
1828. Joseph Alsop and Edward Fairburn.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICES TO CORRESPONDENTS.

A correspondent, whose name we kindly suppress, writes to express his regret that our pages should be filled with "unmeaning invective," in reference to the launching of the *Leviathan*, and to state that he could respect criticism if, "after exposing the failures, there was one worthy suggestion of a more successful course." This gentleman concludes by recommending the launching of the ship upon "rollers, *or upon greased ways*." Now, the resort to the ordinary greased ways is our suggestion, and has been repeated in our pages; yet our correspondent cannot see that we have made "one worthy suggestion!" We recommend him to write no more until the fog lifts from his brain.

W. P.—Coming so late, it does not appear to us advisable to insert your letter.

John Glass.—Yours came too late for insertion this week.

Angelicus.—The information you require can be obtained from any suitable work of reference.

J. A. D. and Capt. Norton.—The publication of your letters is postponed in consequence of certain unavoidable obstacles in the printing of our issue this week. We have a letter for J. A. D., but have mislaid his address.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanic' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

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Francis	Fastening Doors	19
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No. 1796.] SATURDAY, JANUARY 9, 1858. [PRICE 3D.

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DUNN'S UPRIGHT STEAM-BOILERS.

Fig. 1.

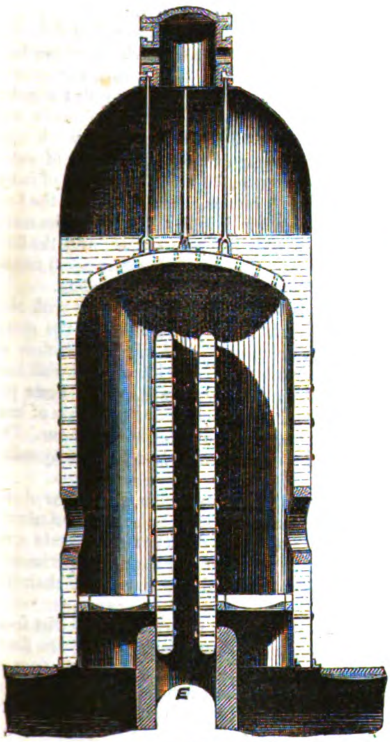
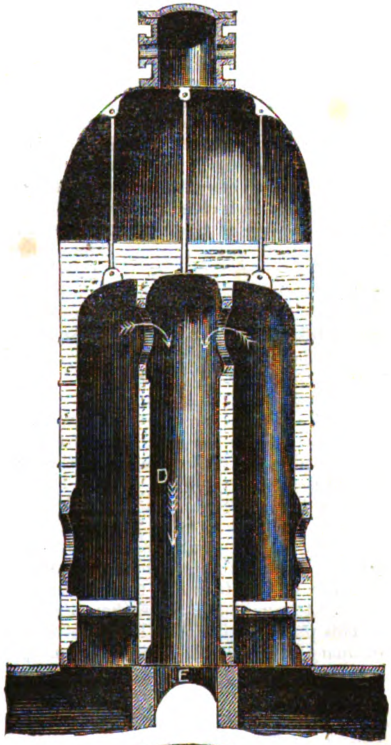


Fig. 3.



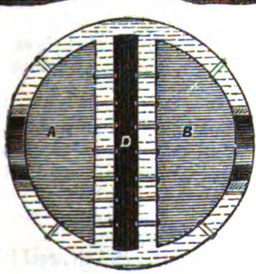


Fig. 2.

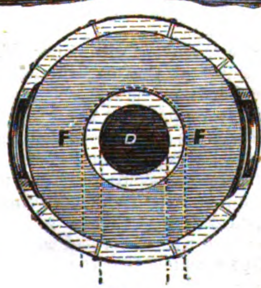


Fig. 4.

DUNN'S UPRIGHT STEAM-BOILERS.

At a recent meeting of the Institution of Mechanical Engineers, held at Manchester, Mr. Thomas Dunn, of that city, read a paper descriptive of the improved upright steam-boilers recently introduced by him. He commenced by saying, the early forms of upright boilers, with the chimney placed through the crown of the boiler or in the side near the top, allowed a great portion of the heat to pass into the chimney flues. An attempt was made some years ago to retain this heat, by placing tubes of small diameter in the crown of those boilers; this, however, caused a liability to the collection of dirt and sediment on the top of the tube plates next the fire, causing them to become burned away, as also the ends of the tubes.

These objections led the writer to endeavour to produce a boiler which should retain the heat without the use of tubes, and should also cause a mixture of the gases for the purpose of burning the smoke. This boiler is shown in Figs. 1 to 4, on the preceding page.

Figs. 1 and 2 represent a vertical section and sectional plan of an improved upright boiler with two furnaces, A and B, the heat and gases from each furnace rising into the crown of the boiler, C, in which they meet and combine, the alternate working of the fires causing the flame from one fire to burn the smoke formed in the other, and *vice versâ;* the heated current then turns down through the space, D, passing again through the water before entering into the chimney flue, E. Several of these boilers have been made and tested, and have proved in work very satisfactory. One of them has been at work nine months at the writer's works, which is of the following dimensions:—Diameter of outer shell, 4 feet 6 inches; height from ground line to top of crown, 10 feet; diameter of inner firebox, 3 feet 11 inches; width of down draught flue D, 5 inches. The whole of the firebox and boiler is of Staffordshire iron, the outer shell being $\frac{3}{8}$ inch thick, and the inner firebox and flue $\frac{7}{16}$ inch thick. The heating surface measures 145 square feet, and the firegrate is $7\frac{3}{4}$ square feet area. The flat water spaces forming the down draught are 3 inches wide, and stayed with screw stays 5 inches apart, similarly to a locomotive firebox.

The following general results were obtained in a set of experiments made with this boiler, taking the mean of three days' working with each description of coal, the steam pressure being maintained at 65 lbs. per square inch throughout, and the temperature of the feed water at 62° Fahr.:—5·90 lbs. of water were evaporated per lb. of coal with best Lancashire coal at 10*s.* per ton delivered, burning 16·48 lbs. per square foot of grate per hour; 4·38 lbs. of water were evaporated per lb. of coal with Burgy or the refuse of coal pits at 5*s.* 6*d.* per ton delivered, burning 20·90 lbs. per square foot of grate per hour. The outer shell of the boiler was not clothed, which caused a considerable loss of heat by radiation in the experiments.

After trying several of these boilers, the writer constructed one with a circular down draught flue, as shown in Figs. 3 and 4, for the purpose of saving the expense of stays; this plan did not give quite so much heating surface, but allowed rather more grate area, and the results of this boiler were found very similar to those of the former experiments. The fire in this boiler is not divided, as in Figs. 1 and 2, and the gases are therefore allowed to combine in the firebox, FF.

This plan of boiler is well adapted for the interior of buildings, where dust and dirt from ordinary boilers would be an annoyance, as the ashpits are below the surface of the floor, and are made to hold the accumulation of a week's ashes. No external iron chimneys or pipes being required, there is also less risk of accident by fire. The expense is not more than that of the ordinary upright boilers. These boilers have been proved with water pressure to 150 lbs. per square inch.

After the reading of the paper, Mr. Henry Maudslay observed that there had been many attempts at the construction of vertical steam-boilers, and inquired what was the main peculiarity in the boiler now described.

Mr. Dunn replied that the principal point was the descending flue inside the boiler, to prevent the great loss of heat that occurred when the draught simply passed upwards into the chimney; this construction also afforded a convenient and compact arrangement for many situations in shops and other places, by having a descending flue passing below the floor, taking up little room and being more free from causing dust and dirt in the shop.

The Chairman asked how long the experiment continued that had been mentioned in the paper, and whether it had been tried on more than one boiler.

Mr. Dunn replied that the trial was for three successive days, and the coal for getting up steam was included, which made the consumption appear high.

Mr. Henry Maudslay said, he believed the description of vertical boiler i most

general use at present was the one used by Nasmyth with the steam hammer, where the heat passed up a circular centre flue; but in that kind a difficulty was experienced in preventing the water spaces from being choked with deposit, and he feared the same difficulty would be found even to a greater extent in the one described, from the number of stays in the flat spaces.

Mr. DUNN said he had had the boiler nine months at work, and had not yet found any difficulty from accumulation of sediment; and he did not think it would arise with ordinary care in washing out.

The CHAIRMAN remarked that vertical boilers with descending tubes had been made by the late Mr. Gough, and used to a large extent as a compact form of portable boiler; and the reversing of the currents by descending flues might give some advantage in economy of fuel. He thought the experiments on the boiler described showed only a small proportion of water evaporated; and asked what observations had been made of the temperature of the heated current passing off to the chimney.

Mr. DUNN said, the temperature of flue had not yet been observed; but in the case of the boiler experimented upon there would be a considerable loss of heat by radiation from the external surface, as it had not been coated, and the exposure would tell more on a boiler of small size.

OUR NAVY AND NAVAL ORDNANCE.

CAPTAIN J. A. DAHLGREN, the chief of the Ordnance Department of the United States Navy, and the officer in command of the frigate *Plymouth*, which recently visited our southern ports, has published a report detailing the experimental trials made on board that ship, and the results of his visits to our dockyards and arsenals. In a recent article upon the *Niagara* we carefully pointed out the superiority of our own ships of war in many respects, and the Report in question singularly and strongly confirms our statements. Yet this very Report was made the text of a violent article against the sluggishness of the Admiralty in the *Times* of Dec. 28, although it contains among its earliest passages one to the effect that the United States Government was urged to the enlargement of their vessels and the increase of their armaments, by the growing superiority of the British navy. After recapitulating the improvements in ordnance, and the various experiments made by his Government, Captain Dahlgren says:—

"The Bureau then adopted the 9-inch shell gun for the gun decks of these vessels, but unqualifiedly refused the pivot 11-inch designed for the spar decks, mounting in lieu thereof 8-inch of 63 and pivot 10 inch. And there the matter might have remained for time or accident to decide, so long as the question was limited in its application to our own navy; but other powers (chiefly England) have been *prompt* to follow the example set by the United States *and to improve on it*. They have constructed ships *yet larger than the Merrimac class*, and given to them *greater speed and cannon of heavier calibre*."

Captain Dahlgren then proceeds to give the results of the trials made on board the *Plymouth*, which was fitted with different descriptions of ordnance expressly to ascertain satisfactory *data* respecting the practicability of employing guns of large dimensions in ships of war. It will be remembered that in our article above alluded to we proved that the large and costly *Niagara* would be far inferior, under all circumstances, to a frigate like our *Diadem*, which is a very much smaller and cheaper ship. The facts and arguments employed in arriving at this conclusion would apply in the same manner, though to a less extent, to the *Merrimac* and other frigates. Let us now observe what Captain Dahlgren himself says upon this point:—

"On the whole I have no hesitation," he says, "in affirming that as a pivot-gun the 11-inch is in every way as manageable as the 64-pounders, which have been so long, and are now, used on board our steamers. And if this be correct there should be no objection to restoring that part of my plan of armament which assigned a tier of 11-inch guns to the spar decks of the screw frigates, *for which, too, there may be a more imperative reason in the fact that until this be done the ordnance power of those ships will not only be less than what it should be*, BUT EVEN INFERIOR TO THAT OF SOME FOREIGN SCREW FRIGATES OF INFERIOR DIMENSIONS. Certainly the present spar deck batteries of the *Merrimac* class are altogether unworthy of being placed there."

In the application of steam power to the ships of the Royal Navy, this able American officer likewise recognises the foresight and

promptness of the English Admiralty as compared with the United States administration.

"In the course of the practice at sea," he says, "no one could fail to remark the unavoidable difficulty of keeping the target within the lateral scope of the guns by manœuvring with sails only, and how much loss of time was thereby occasioned. The superior efficiency of steam under such circumstances would have been invaluable. Undoubtedly, no ship of war can be considered complete which is unfurnished with this motor, while its assistance would compensate for an inferior number of guns, and in many cases confer an irresistible advantage over an opponent. The present practice of the great naval Powers indicates a remarkable unanimity in this respect, notwithstanding the cost consequent upon the use of steam. *No ship of war is now constructed in England without a power of this kind. The official list shows that of* 518 *vessels composing the navy of that country* 289 *have steam; of* 188 *vessels in commission* 126 (*or two-thirds*) *are steamers, beside* 185 *steam gunboats*."

Urged by these and other facts he strongly recommends the construction of a screw corvette for the further prosecution of experiments with the various armaments.

Another practice long since in operation at Portsmouth he recommends in the following words:—

"Many important facts, not procurable in any other way, would be obtained if the Department would authorize the use of one of the old ships as a target for shell practice. Perhaps there is no better purpose to which some of them could be applied."

Captain Dahlgren also visited the gunnery-ship *Excellent* at Portsmouth, and after describing that ship as particularly well adapted and situated for experiments in gunnery, gives a glowing description of the practical skill displayed by both men and officers in working the large guns. Struck with the value and importance of the training there given to our men, he turns to his own navy, and urges that, to insure proper results with ordnance as heavy as the 9 and 11-inch guns, more careful drill and intelligent direction are required than with lighter guns, for it is to be understood that more difficulty will unavoidably be experienced in proportion as the cannon are heavier.

Here, again, is a statement pointing out superior features of construction, both of great importance, in our own ships:—

"In many of the new British vessels, I observed the greater planeness of the decks —a convenience for all classes of guns, but indispensable for the heavier calibres; nor will the most perfect carriages and apparatus, nor the best-skilled crews, avail with pivot guns of the first order, if the constructors will not furnish this essential requisite. The after pivot gun is also unobstructed in the new English ships of all classes by the trunk or continuation of the propeller well; *yet all the screws hoist in every class of vessel, from the sloop upward.* When down, the flat hatch covers the opening, and the gun pivots right over all. *In all our new screw frigates the after pivot gun is shorn of half its power by the presence of the trunk*."

This latter feature—the absence of any propeller trunk above the deck—is deemed of so much consequence by Captain Dahlgren, that he twice mentions it with admiration in other parts of his report. In his remarks upon the *Diadem* he says:—"The after pivot gun is stowed athwart the deck, directly forward of the propeller wheel, which is without a trunk, as in our ships, but is closed by a flat hatch flush with the deck-plank when the screw is submerged, so that the slide traverses without obstruction, and enables the gun to command the entire sweep of the stern, which is well opened for that object, and thus half the purpose in having a stern gun is not uselessly sacrificed, as it is in the United States' screw frigates." And in mentioning the *Charybdis*, a large class sloop which he saw at Chatham, he says again:—"The propeller is to be hoisted, but there is no trunk (or continuation of the propeller well above the spar-deck), and thus a clear sweep is left for the pivot gun when mounted aft, the stern and quarter posts for which seemed, however, contracted."

At Chatham he also inspected the steam frigate *Mersey*, 40, in course of construction, of which he says:—

"The dimensions given are considerably greater than those of our *Merrimac* class, and nearly, if not quite, approach those of the *Niagara*. The capacity of such a hull to unite the highest rate of speed and power of battery is very ample. What the steam power is to be is not stated, but the 40 guns assigned by the official register must needs be of the heaviest calibre; it is reported 68-pounders of 95 cwt. on the gun deck, but I heard nothing on the subject that was authentic. There can be little doubt that with any reasonable success in applying the capabilities of such a vessel she must become the most formidable of ships of war."

As the *Diadem* was the frigate which we selected for comparison with the *Nia-*

gara, it will be agreeable to us to report what Captain Dahlgren says of this ship.

"This ship," he says, "is registered on the official list as a screw steamship, 32 guns, 300 horse power, and exhibits a finished sample of the larger class of new British screw frigates that are designed to rate with our *Merrimac* class, being complete in all appointments, and commissioned for service. She is by no means as large as the *Mersey*, and is even inferior in size to the *Merrimac*, if the dimensions given by the nautical periodicals are correct—viz., between perpendiculars, 240ft.; breadth extreme, 48ft.; tonnage, 2,500. The gun-deck affords fine roomy quarters, even for the massive cannon mounted there. The distance between the ports (nearest sills) being 18ft., while the size of the ports, like the guns themselves, is extraordinary. The pieces which I saw mounted on this deck were 20 10-inch shell guns of 87 cwt., being in reality the original of our own 10-inch gun adopted from the English in 1841, and yet to be seen playing the part of pivot guns in the *Mississippi*, *Macedonian*, and *Constellation*. The exterior figure of the English gun has, however, been remodelled, so as to conform to that of the ordnance generally. * * * On the spar-deck are 10 32-pounders of 53 cwt., mounted and equipped as such guns usually are, and two 68-pounders of 95 cwt., one at each end. * * * The *Diadem* is a warlike looking vessel, ship-rigged, though less heavily masted and sparred than usual. The screw is hoisted, not by the spanker boom, but by sheers stepping on the spar-deck at each side of the well; the legs are readily separable, and, being short, admit of being conveniently stowed out of the way."

We have omitted his description of the carriage fittings of the *Diadem's* guns, some of which he thinks superior and some inferior to the American arrangements. The latter trifling and doubtful exception is positively the only scrap of adverse criticism of our naval affairs which we can discover throughout this elaborate report of one of the most sagacious and experienced officers of the United States' navy.

In noticing what he saw at Woolwich Arsenal, however, Captain Dahlgren, while awarding the utmost praise to that establishment, raises the question as to the advisability of the Government undertaking the manufacture of its own ordnance. Upon this subject there is much to be said on both sides, into which we do not here propose to enter. It is worthy of remark, however, that although this question belongs exclusively to the War Department in Pall-mall, the *Times* sees in it sufficient ground for one of its hottest attacks upon that very Department—the Admiralty—the arrangements of which have been the theme of Captain Dahlgren's admiration in almost every paragraph of his Report.

"The Admiralty refused for a long time to innovate at all, and we went on building sailing ships long after the whole world had adopted steam as the proper motive power. We then went on for a long time building paddle steamers, in spite of the known fact that paddles put the ship at the mercy of a single shot, and, moreover, leave no room for guns; and it was only when the sea was covered with screw steamers that we at last adopted the screw. Then the Admiralty built iron ships literally by the dozen, till the very simple experiment of the effect of a shot upon iron proved that they were wholly useless for war. Then the Admiralty built three-deckers till the Baltic campaign showed that these very fine ships required the open sea for their movements, and could not near a shore; and gunboat-building had just begun with frantic speed when peace was proclaimed. Here is a succession, then, of shipbuilding operations, all of which have turned out complete failures, either because they were continued too long, or were begun too late."—*Times*, Dec. 28, 1857.

Candidly, we cannot see one true statement in this paragraph. According to it, paddle steamers, screw steamers, iron ships, three-deckers, gun-boats—all "have turned out complete failures!" Such criticism is simply disgraceful, and is enough to deafen the Admiralty to all criticism. In the first place, paddle steamers have been of immense service in the navy, both out of and in action. In the next place Captain Dahlgren has shown that we are far a-head of the United States in the introduction of the screw propeller into the navy. In the third place the number of iron ships of war built was very limited, and the very worst of them was built by contract by one of the most eminent engineers in the kingdom. Fourthly, at this very moment the country, deficient as it is of troops in consequence of the Indian mutiny, derives its main security from the presence of a number of large steam-ships of the line. And, fifthly, the building of gun-boats was commenced extensively, not "frantically," long before peace was proclaimed; and, without ever going into action, did much, by their mere existence, to extract those concessions from Russia which the country seemed to be content with. The delay in building them rested, in all probability, not with the Admiralty,

but with that Cabinet of Ministers to whose feeble and vacillating policy all the Government departments were subject. With reference to the gun-boats we now possess, many of which are doing good service abroad, Captain Dahlgren, in his report, says:—"This is a class with which we are entirely unprovided, and yet of great interest to us, by reason of their adaptation to the shallow waters of our southern seaboard, where heavier vessels would be entirely useless."

We do not, of course, intend to imply, in what we have said, that the Admiralty are not open to adverse criticism in their management of the great interests over which they preside, for we are well aware of the contrary; but we think it is manifest that nothing can be more absurd than to follow the very laudatory report of Captain Dahlgren by the extravagant statements of the *Times*.

In the same article the *Times* asserts that the British Admiralty are always slower than all other Governments in naval matters, and asks why it is that they "always let others take the lead, and never by any chance originate or precede." That there are reasons which induce the Government of this old manufacturing and commercial nation to exhibit some reluctance to display a spirit of rivalry in the arts of war there can be no doubt; but the best answer to the question proposed is to be found in the report of Captain Dahlgren, which shows that the British Navy is at the present moment so much in advance of that of the United States, that the Government of the latter must forthwith increase the number and dimensions of their ships and the power of their armaments, if it is at all to keep pace on the seas with Old England.

ELECTRO-MAGNETISM AS A MOTIVE POWER.

At the discussion which recently took place, at the Institution of Civil Engineers, upon Mr. Hunt's paper on electro-magnetic engines, it was made apparent that there are many persons who are inexplicably strenuous in resisting the spread of electro-magnetism as a motive power. Although these persons are singularly prone to lose sight of the fact that the electro-magnetic force has been, and is, already satisfactorily in use, there is, nevertheless, sufficient pertinence in their arguments to render them worthy of the study of practical men. Their views will not prevent the use and improvement of electro-magnetic machines, but they may and ought to prevent exaggerated expectations as to their results. Mr. J. P. Joule, F.R.S., whose researches have greatly extended our knowledge of the actions of forces, and taught us much regarding the beautiful laws which govern their transformation, is one of those who hold strong opinions of the inutility of such machines; and the article upon the subject quoted in our last Number has elicited an announcement of his views upon the subject. The following is the essential part of Mr. Joule's statement:—

"An electro-magnetic engine consists of two parts—viz., a voltaic battery, and a system of moveable bars of iron surrounded by coils of wire. The current from the battery traverses these coils, and by means of suitable contrivances is made to pass alternately in opposite directions, whereby alternate attractions and repulsions are produced, by means of which a continued motion takes place. Now, a current of electricity traversing a conductor gives out a quantity of heat determined by fixed laws, which necessitates the invariability of the amount of heat given out by the entire circuit for each pound of zinc consumed in a given battery so long as the engine is kept stationary. But the instant it is set in motion a reaction takes place on the intensity of the current, occasioning a diminution in the quantity of heat evolved by the circuit during the consumption of each pound of zinc. The heat which thus disappears is not, however, destroyed; it is converted into the mechanical force given out by the engine, each degree of heat per capacity of a pound of water being thus converted into a mechanical force represented by the fall of 1 lb. weight through 772 feet. Therefore, in order to find the quantity of work which can be got from an absolutely perfect electro-magnetic engine, we have only to ascertain the quantity of heat due to the consumption of zinc in the battery, and then to find, by means of the above relation, the work to which that heat is equivalent. The *Philosophical Magazine* for December, 1843, p. 441, contains an account of such experiments, the result being that 1 lb. of zinc consumed in a Grove's battery is able, if all the heat be utilized, to raise 1,843,600 lbs. weight to the height of one foot; but that in a Daniell's battery only 1,106,160 lbs. can be raised by the same consumption. Subsequent researches have altered these figures a little, diminishing them to about 1,698,000 lbs, and 1,019,000 lbs. Hence the utmost work which could be performed by an absolutely perfect engine by each pound of zinc consumed in the best battery, is 1,698,000 lbs. raised one foot, which

in Watts's estimate is equal to one-horse power exerted during 51 minutes. The conditions required by the French are stated to be, 'that the machine shall work one horse-power on an expenditure of not more than half a kilogramme of zinc.' This, converted into English measure, using Watts's standard of horse-power, demands a work of one horse-power during 54 minutes for each pound of zinc, or three minutes longer than an absolutely perfect engine could perform."

However well meant these remarks may be, we confess they are not at all conclusive to our mind. Mr. Joule professes to understand the *modus operandi* of Nature in producing electro-magnetic force from zinc and acid. But is not this presumption on his part? He speaks a great deal about the *heat* produced from the battery, and deduces from this the maximum work which an electro-magnetic engine can do. But he gives us absolutely no reason for this mode of proceeding, and no ground for his deduction. In short, we think it an undue stretch of scientific principles to announce what amount of work an electro-magnetic engine will do, before we have even found out what is the best construction to give to an electro-magnet. If Mr. Joule's views are correct, it is highly desirable that he should give us a more satisfactory statement of them.

THE LAUNCH OF THE "LEVIATHAN."

Monday, Jan. 4, 1858.

PREPARATIONS for a renewed attempt to launch this ship having been very nearly completed on Saturday last, we again visited the scene of operations this day in the forenoon. The number of hydraulic presses fitted were then found to be six single and two double to the after cradle, and eight single and one double to the foremost cradle. Of those applied to the after cradle one was the huge press formerly employed for raising the Britannia-bridge. The newly-applied presses are placed against piles, driven between the baulks which compose the launching ways over which the ship has already passed. This appears to be a good arrangement, inasmuch as the piles are thus considerably supported by the massive work of the slide-ways themselves. A fore and aft baulk plated with iron has also been placed against the ends of the cradle pieces or bilgeways (which lie athwartships) for the hydraulic presses, or rather the intermediate lengths of timber, to abut against. For improving the river purchases, the whole of the anchors have been removed from the bed of the river, except a couple of Trotman's, which, though found less efficient than some of the others, were so well supported by the piles already driven as to afford sufficient resistance. With this exception, the strain of all the cables is now received on the Deptford side of the river by masses of piling driven deeply into the earth. The cables manufactured by Messrs. Brown, Lenox, and Co., of Millwall, have hitherto stood better than any cable of the size could have been expected to stand, and another of their manufacture, made for the *Leviathan* herself, has been added to those previously used on the launch. After a careful examination of the whole of the arrangements we are convinced that the pushing and hauling appliances have this time been well and judiciously fitted. Of one newly-adopted arrangement—that of working several of the hydraulic presses in combination—we do not think very highly. There would be much to be said in its favour if all the presses so connected were of one power; but as some of them are of much less power than the others, and as the whole will have to be kept down to the power of the weakest, we think a needless reduction of effect will be incurred. Between two and three o'clock this afternoon Mr. Brunel, accompanied by Mr. R. Stephenson, M.P. (who has been much at Millwall lately), were making a final examination of the presses before starting, but as the days are just now very short we much doubted if any attempt to move the ship would be made to-day, and therefore left for town.

Our recent article upon Mr. Brunel appears to be considered, by a few individuals, somewhat too severe. No one thinks, so far as we hear, that we were wrong in censuring the building of the ship where she is; but the persons mentioned believe that the selection of iron surfaces was not deserving of our strong condemnation. We have been unable, however, to elicit any very satisfactory reasons for their belief. One vaguely says, the great weight to be sustained was a sufficient inducement to resort to iron. Another says, Mr. Brunel chose iron because the ship would have launched herself too rapidly with greased wooden surfaces. Another, that he chose it because he intended to force her off, but has slightly miscalculated the power required. Another, that the iron on iron is all right, but there is too much surface. And another (Mr. R. Armstrong, of Limehouse), that the only error lies in the butts of the rails being cut square, instead of lapping over each other, as the plank butts of ordinary launching ways are fitted.

Our readers will see, however, that our position is not much affected by these objections. It is certain that a great error has been committed. The ponderous checking apparatus used affords a sufficient answer to those who think Mr. Brunel intended to force and haul her off at a slow rate. The operations of the last two months show that no slight miscalculation only has been made. The too-much-surface view is somewhat difficult to entertain, although the rails hitherto passed over certainly exhibit no signs of extreme abrasion or wear—a fact which also applies to Mr. Armstrong's objection; at the same time, we think the butts should undoubtedly have been somewhat inclined, as he suggests.

Having thus stated and considered the views of those opposed to us, we may add a word in our own favour. The view we took of the matter has been confirmed by many. We have personally received opinions coincident with our own from several experienced engineers and shipbuilders. One of the latter, in a letter which he does not wish to have published entire, says:—

"The fact is, *you* needed no suggestion from me; you proposed to take the 'bull by the horns,'—block and shore the ship, remove the cradles, and set to work *de novo*, with the appliances of an ordinary launch; *and I have heard a dozen professional men of eminence say that this ought to have been done a month back.* I assure you I am not disposed to dispute this. It occurred to me, however, that many considerations (which, perhaps, ought not to have stood in the way), both of expense and feeling, might be opposed to this."

"Nauticus" writes to us privately respecting our remarks upon the letter published by him in the *Times*. As we appear to have given him too little credit for exactness in those remarks, we extract from his letter to us the following passage, which will do justice to our excellent correspondent, and set the matter right. He says:—

"You state that I overlooked the iron plates on the cradle-base, and that, therefore, my method was impracticable. In the commencement of my letter I referred to those plates, and I never lost sight of them, although, perhaps, the vague manner in which I described my principle of launching fully justifies you in thinking that such was the case. Upon reflection, I should make my 'sole-pieces' with less taper,—say $2\frac{1}{2}$ inches at the thick end and 1 inch at the thin end; and it might be advisable to have angle iron at their edges to stiffen them. Upon their upper surfaces chalk marks might be made to indicate the exact position of the iron plates; this could be done with the utmost accuracy; and between the spaces to come into contact with the plates pieces of elm-board, 1 inch thick, might be nailed. Now, as no part of the sole-piece, so fitted, would be more than $3\frac{1}{2}$ inches thick, it could be pushed into the space between the angle irons (assuming that to be $3\frac{1}{2}$ inches deep), and rest upon the ways with the elm-pads immediately under the spaces between the iron plates; and all that would be required would be to raise them into contact with the lower surface and plates of the cradle-base. I am sure Mr. Hepworth, whose fertility of resources I have frequently admired, would accomplish this; I would undertake to provide a dozen foremen shipwrights who would do it."

We continue to receive suggestions for obtaining the requisite power to force or haul the "Leviathan" to the water upon her present ways. An experienced engineer, Mr. John Braithwaite, suggests that the rise and fall of the tide might simply and easily be made available for the purpose, by employing a large ship or two, which the Government might lend from the reserve at Sheerness, if not otherwise obtainable. There can be no doubt about the efficacy of this plan in a river having so large a rise and fall of tide as the Thames at Millwall. Mr. C. W. Smartt proposes to employ the force of the current of the river acting on submerged resistance planes.

Tuesday.

It appears from the papers this morning that one of the barges carrying part of the hauling-off apparatus was sunk late yesterday, by a barque which was carelessly allowed to run into her. The cold weather, which appears to have commenced in good earnest this morning, will also prove unfavourable to the prosecution of the launch.

Thursday.

The ship has been moved nearly 20 ft. by the labours of Tuesday and Wednesday, without any serious mishap. Numerous fires are now kept up to prevent the hydraulic apparatuses from freezing.

CLEARING THE LUNAR DISTANCE.

To the Editors of the Mechanics' Magazine.

Gentlemen,—If I venture on this subject to trouble you with my remarks, in reply to a letter from an officer, whose practical familiarity with observations is, beyond all comparison, greater than my own, it is not without many misgivings. But my thoughts have been long occupied with the

point which appears, rather than the mere *modus operandi* in the solution, to be General Thompson's object, namely, the abridgment of calculation. Possibly, from having considered it from a different point of view, I seem to myself to perceive some serious difficulties in the way of carrying his suggestions into practical use. Difficulties, however, are things to be surmounted; a preliminary step is to state them.

The first thing that suggests itself to me is to inquire what proportion of the work a machine would save. If it would perform the whole of an operation, which is the very bugbear of seamen, it would be invaluable. But to me, the vexatious part of the process has not been the specific solution of the two spherical triangles, but rather the little teasing corrections, for index error, barometer, thermometer, refraction, dip, parallax, and semi-diameter, necessary to deduce the true from the observed altitudes. Then, after all this has been cleared, and the bit of spherical trigonometry worked, or "dodged," comes the computation, which Callet speaks of as "plus vétilleuse que difficile"—to find the time or longitude from the true distance. It is the endless mass of detail, rather than the difficulty of any particular step, which causes the problem to be regarded as such a nuisance. I have now before me several books on navigation, and in every one of the examples I find it to be these "odds and ends" which fill more than half the paper. It is among them, too, that most frequently lurks error.

A lunar observation is made for one of two objects. The first is to ascertain a ship's place at sea. For this purpose, the whole work, down to the very last step, must be done then and there. The main reason for desiring to simplify the computation, is because an unready reckoner has to go through it when he is not at leisure; but in that very case no mechanical help can be given.

The second object is to establish the position of a rock, shoal, or seamark. In such a case it would be sufficient to log the observations unreduced. I imagine that the Hydrographer of the Admiralty or the Geographical Society would be disposed rather to thank a captain for communicating them, than to expect him to reduce them, even supposing they would trust his reduction. I do not know who else would, or could, make use of the communication. As regards the cost of reduction, I think competent men could easily be found, who would contract to reduce apparent distances to true distances for 10*l.* a hundred, by two independent computations. As to the establishment of the position of observatories or central stations of survey, I think the persons in charge would not grudge clearing a few lunars; but I do not think they would be satisfied with the degree of accuracy afforded by those observations in their ordinary form. With reference to the number of imperfect observations which will serve in lieu of one good one, it should be remembered that the probable error varies inversely, not as the number of observations, but as the square root of that number.

Returning now to the main problem, it appears to me that half the difficulty which besets it arises from the inveterate bad habits of writers on navigation, giving rules unaccompanied by *formulæ* or proofs, and substituting approximative "dodges" where the direct method is more lucid and exact, and nearly as short. For a person who can sit down quietly to the work, I see nothing very heavy in it. I should certainly not walk far to find a machine for it, unless I had a great many to work out.

It may save trouble to some of your readers if I give a short sketch of the best direct method—one which Capt. Kater preferred to Borda's.

In a spherical triangle, A B C, let C be the zenith, and A, B, the apparent places, corrected for parallax, &c., of the star and moon's centre. Take A′, B′, in C A, C B, (produced if necessary) for the true places. Then if, as usual, we call a side by the small italic letter corresponding to its opposite angle, and make $S = \frac{1}{2}(a + b + c)$, we have—

(1) in the triangle A B C, given the three sides a, b, c, to find the angle C. By the ordinary rule,

$$\text{Sin}^2 \tfrac{1}{2}\, C = \frac{\sin(s-a)\sin(s-b)}{\sin a \sin b}$$

(2) Then in the triangle, A′, B′, C, given the two sides a', b', and the included angle C, required the other side k, or the true distance. For this we have

$$\text{Cos } k = \sin a' \sin b' \cos C + \cos a' \cos b';$$

whence

$$\text{Cos }(a' - b') - \cos k = 2 \sin a' \sin b' \sin^2 \tfrac{1}{2}\, C.$$

Transforming the left-hand side, substituting (1) on the right hand, and dividing by 2,

$$\text{Sin}^2 \tfrac{1}{2}\, k - \sin^2 \tfrac{1}{2}(a' - b') = \frac{\sin a' \sin b'}{\sin a \sin b} \sin(s - a) \sin(s - b).$$

Call the right-hand side of this equation X, and take an auxiliary angle ϕ, so that

$$\tan \phi = \operatorname{cosec} \tfrac{1}{2} (a' - b') . \sqrt{X} \quad \text{or} \quad X = \tan^2 \phi \sin^2 \tfrac{1}{2} (a' - b').$$

Then we have, obviously enough,

$$\operatorname{Sin}^2 \tfrac{1}{2} k = (1 + \tan^2 \phi) \sin^2 \tfrac{1}{2} (a' - b') = \frac{\tan^2 \phi}{\sin^2 \phi} \sin^2 \tfrac{1}{2} (a' - b')$$

Whence

$$\operatorname{Sin} \tfrac{1}{2} k = \frac{1}{\sin \phi} \sqrt{X}.$$

We are thus led to the logarithmic solution of the problem, as follows:—

Take $\log X =$ ar. co. $\log \sin a +$ ar. co. $\log \sin b$
$+ \log \sin (s - a) + \log \sin (s - b)$
$+ \log \sin a' + \log \sin b'$.

Then take ϕ, so that

$$\log \tan \phi = \tfrac{1}{2} \log X - \log \sin \tfrac{1}{2} (a' - b'),$$

and we shall have

$$\log \sin \tfrac{1}{2} k = \tfrac{1}{2} \log X - \log \sin \phi.$$

From this $\frac{1}{2} k$, and therefore k, can be found.

Borda's method only differs from this by the use of the cosines of the half angles, instead of the sines.

The question of how far accuracy can be obtained by a machine, which would solve the question mechanically, is one with which I do not feel competent to deal. But I confess I do not see my way to anything which would not require at least one shifting pivot, and thus would scarcely allow of accuracy, even to minutes. If great accuracy is attempted, even with simple machines, the adjustments take up more time than a moderate computation.

I am, Gentlemen,
Your obedient servant,
CHARLES MERRIFIELD.

6, Brompton-grove, Jan. 4, 1858.

ON NIGHT CLOCKS, AND A NIGHT COLUMN.

BY GENERAL T. PERRONET THOMPSON, M.P.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—An object not unworthy of attention in your publication may be the construction of a Night Clock, or other machine for exhibiting the hours by night with the greatest possible effect, or to the greatest possible distance.

The efforts in this direction hitherto made in this country have not amounted to much more than might result from holding up a lantern to a clock-face. Yet the purpose appears capable of being carried out to an extent which would be in a high degree useful and ornamental.

And first, if the system is to be applied to the ordinary mode of representing the hours, the shortest way will be to describe a miniature model:—On a sheet of pasteboard sketch the face of a clock in the ordinary manner; but in place of each of the twelve usual figures cut out a hole, for which the best form will probably be a square, of side equal to what would be the height of the Roman numerals if employed, and with its corner turned lozenge-wise towards the centre of the face. From that centre describe a circle, touching (or nearly) the nearest corners of the lozenges. Cut out this circle and fix it (as may easily be contrived), so that it shall turn round in its old place. On this circle describe and cut out the form of a hand, as usual in clocks; but it appears unnecessary to prolong it on the other side of the centre. Paint the whole black; and on placing a candle behind it, there will be seen a lively representation of a Night Clock.

In the real machine, all these spaces must have glass before them; and it would be matter of easy experiment to determine whether this should be plain, or rough ground, or have a blueish tinge by way of making the light white, on the principle applied in blueing linen.

If it was desired to add the effect of a minute-hand, it must be done by means of a concentric solid ring outside the marks for hours, revolving round the common centre once in an hour. In this must be cut out a mark or index, as, for instance, the shape of a hand with the fore-finger pointing inwards. The means of making this revolve without interfering with the rest of the machinery, or with the light, would be within the compass of any ingenious mechanic.

How the light is to be supplied, would be matter for distinct experiment; and useful reference might be had to what is

practised in lighthouses. The ways which present themselves are, either that each mark for the hours should have its distinct lamp or gas-light, and for the hand the requisite number of lights, with provision for their always maintaining an upright position, and the same for the supposed minute-hand; or else, that it might be found better to illuminate the whole by one intense light behind.

The hour of the day by St. Paul's is distinguishable in the Regent's Park; and there can be no reason to doubt that a night-clock of similar dimensions might be made effective to much greater distances.

But in the ordinary way of marking the hours there is the disadvantage that, to be of extensive use, there must be many faces; four being the fewest that can approach to embracing the whole horizon. It is not difficult to imagine a different representation of the hours, which would form a splendid object in any city or large town, especially in one like London, where the views are extended by the presence of a wide river. And here, as before, the best way is to suppose a miniature model.

Imagine the chimney of a steam-boat; and, touching the top, paste on it six equidistant squares of paper, of side equal to a twenty-fourth part of the circumference, and with a corner pointed downwards, lozenge-wise. To each of these add another underneath, with the angular points joining; and so on till the number in each of these chains of lozenges amounts to twelve, the whole resembling a style of ornament not unusual on the waters. Cut out the parts covered with paper, and inclose the whole in another cylinder of metal, of length equal to the chains of lozenges; and let this outer cylinder be hoisted up at twelve o'clock so as to cover all, and then gradually lowered by clock-work. Put lights inside, and there will be a representation of a Night Column for showing the hours.

The real machine must be a column of stone or other proper material, on the scale of an ordinary sea lighthouse; that is to say, capable of containing the lights and machinery, and men to attend them. The lozenges for the passage of the light should be opened or cut away inwards, to the extent of 30° on each side, to make the light visible without change of form to spectators in an oblique direction; and the glass should be on the outer surface, and capable of being withdrawn to the inside, for the purpose of clearing away snow or smoke which might attach itself. The external cylinder should be of sheet iron, of no greater thickness than necessary for strength.

Supposing the process to commence at 4, p.m., on a winter's day, the outer cylinder would be raised as high as the bottom of the fourth lozenge from the top all round, and be gradually lowered by ordinary clock-machinery till midnight. At midnight the outer cylinder would be raised so as to produce total darkness; or if that operation occupied any sensible time, allowance might be made for it by placing something to stop the rising of the cylinder before the darkness was absolutely total. The light thenceforward would increase, and continue doing so till daylight. The total length of column required, would be something less than four diameters and a half.

It is needless to say what a striking object such a construction would be, if placed at the height of the Monument, the Duke of York's or Nelson's column, or the Tower at the Houses of Parliament; and how useful to great numbers of the population, particularly if in a situation to be seen by the men of water-borne businesses. To tell the hour might require a learning, and so it does in the common method. But it is to be surmised that any of the concerned would learn the one as quickly as they did the other.

In any attempts of the nature proposed it would be prudent to proceed cautiously, and be well provided with previous experiments, which may be made very cheaply. Let any man block up his upstairs window with the exception of three panes running diagonally or at cross corners, and putting lights behind, see to what distance he can distinguish the shape of the panes. And let him try whether this can be aided by covering the panes with lawn paper to diminish the glare, or by colouring the paper with any transparent colour. There is a tendency in brilliant objects to lose their definite form and appear circular, as instanced in the planets, which on the glare being reduced by passage through a lens are shown to be gibbous, or crescent; and it is possible some of the methods named might have the same effect.

Finally, if lozenges persist in losing their form, it might be matter of experiment whether *circles* would not answer the purpose in view.

Yours very sincerely,

T. Perronet Thompson.

Eliot Vale, Blackheath, Jan. 6, 1858.

ELECTRIC LIGHTS.

To the Editors of the Mechanics' Magazine.

London, Jan. 4, 1858.

GENTLEMEN,—I wish to reply to a communication inserted in your Number for Dec. 26, 1857, signed "A Reader of long standing," relative to the electric light. If your correspondent referred to a lamp used some years ago by the Electric Power, Light, and Colour Company, his remarks would have been correct. These, however, will no longer be applicable to the lamp at present possessed by the said Company, in which all the defects named by him are remedied.

The lamp to which I refer was invented and made by me: patented April 3, 1855; No. 739; and sold by me to the Company the same year.

With regard to his remarks on batteries, I agree with him that great improvements have yet to be made. Our knowledge of electricity is in its infancy, but, as we advance in information, it does not seem unreasonable to expect that we may succeed in the construction of batteries vastly superior to those at present known in power, economy, and portability.

Electric lamps may be classed under four heads.

First, those in which the separation of the electrodes is produced and regulated by clockwork, or other mechanism acting independently of the electric current.

Second, those in which the mechanism, although depending upon the electric current for its action, remains inoperative until that current ceases, from the resistance offered to its passage by the increased separation of the electrodes.

Third, those in which a carbon disc and pencil, or two carbon disc electrodes are used.

I agree with you, Messrs. Editors, as to the causes which have led to the failure of the above three lamps.

With your permission, I will endeavour to describe briefly the construction and operation of my lamp—the *fourth*.

I use two electro magnets, the coils of which are traversed by the same electric current. To the armature of one of these magnets I attach the lower or negative carbon electrode; to the armature of the other magnet a brake is attached, which acts on the periphery of a wheel attached to the axis of a drum, around which a chain or cord is wound; to the other end of the chain a weight is hung, which carries off the upper or positive carbon electrode. When uninfluenced by the electric current, the brake does not press upon the wheel, and the weight descends by its own gravity, carrying the upper electrode with it, until it comes in contact with the lower one. But upon connexion being made with the battery, the following action takes place:—

Both magnets acting simultaneously, the armature which is attached to the lower electrode is drawn down UPON its magnet, whilst the brake is made to press upon the wheel by the armature attached to it being drawn TOWARDS the magnet which governs it; the upper electrode is thus prevented from descending, and the separation of the electrodes necessary for the production of the light is at once made. The brake armature is adjusted so that it shall remain at a considerable distance from the magnet; it is therefore sensible to any VARIATION which takes place in the force of the electric current.

Thus, when the distance between the electrodes increases from their gradual consumption, the resistance to the passage of the current becomes greater, and the power of the magnets is diminished. The brake is then liberated from the wheel, and the upper electrode descends until, by its APPROACH to the lower one, the resistance to the current is diminished, when the brake is again drawn on to the wheel, and the further descent of the electrode is arrested. It is thus supplied exactly in proportion to its consumption. The consumption, in fact, is the governing power of the supply.

The average variation of the distance between the electrodes does not exceed the $\frac{1}{800}$ of an inch.

The armature to which the lower electrode is attached is practically unaffected by the variations which take place in the force of the current, as it is almost in contact with its magnet, being only separated from it by a piece of card. Its office is merely to make the separation of the electrodes when the lamp is first put in action; but in case of accident, such as either of the electrodes being broken off so as to cause a total cessation of the current, the armature of the lower electrode would rise, whilst the upper electrode would descend until it came in contact with the lower one, when the same action would take place as at the starting, and the light would be immediately re-established.

This lamp requires no re-adjustment so long as the same battery power is used. Its construction is perfectly simple, therefore not liable to derangement. It requires no attention after being put in action.

When furnished with a sufficient battery and good electrodes, it has never yet failed to give a constant and steady light. I have proved this many times, both pub-

licly and privately; and it has frequently been burning for seven or eight hours consecutively, and would burn for any given time in proportion to the length of electrodes and condition of the battery.

I am, Gentlemen,
Your most obedient Servant,
HENRY CHAPMAN.

2, Owen's-row, St. John's-street-road, Clerkenwell, E. C.

MONSTER GUNS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Although unwilling to occupy your pages further on the above subject, yet, as Captain Blakely has to some extent misunderstood my prior statements, it is due to him, at least, that I should make clear what I had intended to set forth.

I did not designate the combined gun alluded to and constructed by Captain Blakely "a failure;" and, further, on referring to your No. 1,787, I perceive it to be quite analogous with my own proposition. What I stated was, that I deemed the "three-feet mortars, made of concentric wrought-iron shells, at an enormous cost, to be of little or no practical value;" and the trials since made, at charges far below what was intended, have, I believe, confirmed this view of the matter.

Again, Captain Blakely makes it appear to be my opinion that a bar of wrought iron "stretches to about ten tons per inch without *permanent injury*." I must not admit this conclusion, having long advocated the contrary. As a practical instance, every bar of the chains of the new Chelsea suspension bridge made at these works has been proved to 13½ tons per inch, eliminating the quality of the iron by a certain small and (by the contract) limited permanent elongation, and after which no further disturbance of the structure can be consequent on the stretch of the chains up to that point.

Then Captain Blakely seems to draw from my observations a notion that it requires but "great nicety" to obtain from wrought iron a strength of "20 or even 30 tons per inch." If by strength he means, as I do, sustentation of steam without disturbance, then I deem this to be an impossibility with the material called iron.

One word more on the normal elasticity of wrought iron. The primary returnable stretch, not microscopically but practically viewed, varies according to the quality of the iron as much as from 8 to 12 tons per inch strain; and, at a ton or two after the permanent set commences, great irregularity in it generally ensues. Therefore the usefulness of the iron is chiefly dependant on the point at which the normal elasticity commences, and which is a safe and certain test of its stoutness and rigidity, but which has been much neglected or little known. I stated the normal elasticity to be "nearly a constant quantity;" for however much we stretch the iron, either by heat or mechanically, this elasticity of nearly ⅛th inch in 10 feet is scarcely at all interfered with. And it must be obvious that this is the limit of a permanent grip in using wrought iron as a band.

The hardness and homogeniety of cast iron cause it to be the best material for the interior of guns and mortars, but the greater strength and resiliance of wrought iron best adapt it for the exterior. As to the suggestion of employing wire, this may offer the longitudinal tenacity, but must be wanting in coherence or solidity.

Although I several years back proposed, as stated in my former communication, the application of wrought iron bands to cast iron cannon and mortars, and carried it out on an hydraulic ram, I desire to put forth no claim to originality for so obvious a device, and my present object is to make generally known an inherent quality of iron on which its success is dependent.

Yours obediently,
THOMAS HOWARD.

King and Queen Iron Works, Rotherhithe, 4th Jan., 1858.

BENZOLE, NAPHTHA, AND OTHER LAMPS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—It is to be deeply regretted that Mr. Mansfield, the inventor of Benzole, was not a mechanic as well as a chemist, for had he been, both his own valuable life and that of his assistant might (humanly speaking) have been spared, and he might have so matured his excellent ideas as to have enabled us to light our houses, &c., with Benzole, as desired by your correspondent.

Having inspected the apparatus he used in his experiments on distillation, I should have been sorry to have been in the room while half a pint was under treatment; while, on the other hand, I have seen 80 or 90 gallons of the same liquid, quickly and quietly vapourizing and condensing without the possibility of accident.

I believe there are one or two difficulties in the carrying out of his plans. Wherever Benzole is used for lighting on Mr. Mansfield's arrangement, a motive power engine must be in action during the continuance of the lighting effect. It is also open to

the same objections as Lowe's Naphtha Light and Beale's Air Light, namely, that if conveyed any distance (beyond a few feet) in pipes, condensation takes place to such an extent as by its obstruction to cause an unsteadiness in the lights, while, at a given distance, the vapour is so impoverished, that it scarcely gives any light. This objection has and always will be fatal to oil gas, when made at a distance from where it is burnt. Mr. Holliday, of Holborn, can supply gas from naphtha, self-generated in a peculiar lamp; or your correspondent might use the Pyrogenic Oil Gas Light, made by Mr. Holmes, also of Holborn. Handsor's Olefiant Gas Company seems to have gone out, after an ineffectual attempt to illuminate a booth.

I am, Gentlemen, yours truly,

John Glass.

TO THROW HOLLOW SHOT AND SHELL WITHOUT A MORTAR.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Some twenty years ago, a gentleman, residing near Wrexham, wrote to me, stating, that on trying an experiment with one of my iron percussion winged grenades, the grenade, having been thrown from the upper window of a house, did not fly to pieces by explosion on striking the ground, but took a bound into the fields to a distance of five hundred yards. Taking the *hint* that the grenade gave me, I, about five years ago, when residing at Cork, had a solid ball turned of tough elm timber, twelve inches in diameter, and attaching to it a common wine quart bottle charged with gunpowder, and having a piece of Bickford's waterproof fuze, about sixteen inches long, passing through the cork into the powder charge, I lowered the wooden shot into the water from a boat in Cork harbour, and then, lighting the fuze, rowed away as fast as the boatmen could pull to a respectful distance. When the fuze burned down to the charge, the bottle being undermost, exploded, and threw the heavy wooden ball upwards to the height of three hundred yards or more, the water acting as a fulcrum. Judging from these two results, I am of opinion that strong cast shells, of *thirty* inches diameter, and charged with gunpowder, might be thrown some fifteen hundred yards, without the aid of a *heavy* mortar, by merely using an iron platform of four feet diameter as a fulcrum for the shell, resting on its fuze, to spring from. Gun cotton is well adapted for demonstrating the application of explosive agency as a *motive* power.

J. Norton.

Rosherville, Dec. 21st.

MISCELLANEOUS INTELLIGENCE.

Gas Regulators.—Messrs. Sudbury and Linsell, of Halstead, Essex, have patented an instrument, the object of which is to maintain an uniform supply of gas to the burners, unaffected by any varying pressure in the mains. The gas from the supply pipe is admitted through a tubular passage into a chamber, the upper part of which is closed by a flexible diaphragm. From this diaphragm is suspended a piston, working freely up and down in the tubular passage, which has a hole or holes cut in its side for the admission of gas. An outlet orifice at the side of the chamber conducts the gas to the burner. Any increase of pressure beyond the regulated amount raises the diaphragm, and with it the piston, thereby partly closing the holes in the side of the tubular passage, and checking the admission of gas to the burners. When this extra pressure is diminished, the diaphragm and piston falls, uncovering more of the holes, and presenting increased facility for the entrance of the gas to the burners.

The Palmerston's Foresight.—A gentleman of Liverpool, England, has proposed to build a ship which will dwarf even the *Leviathan*, to be called *Palmerston's Foresight*. The proposal was first received as something worthy of attention, but it has been found from his model that it would be unfit for any practical purpose, being almost flat bottomed, with vertical sides, and no visible keel; in fact, it is but a gigantic box that might swim, but would be of no value as a ship. We chronicle this fact to illustrate the mistakes that persons make when undertaking to invent or improve upon anything without first fully understanding what they are about.—*Scientific American.*

A Curiosity of Scientific Literature.—"At the end of the year, if we have in any way fulfilled our promises, we feel inclined to rub up the memory of our readers, so that not a tittle of our very few good works may be forgotten—having no inclination whatever to hide our light under a bushel; of course, leaving them to make their own discovery of what we have failed to do. Knowing our own shortcomings, the feathery part of our editorial pen bristles up like the coat of a frightened cat, prepared for an attack upon all quarters, saving our hind ones, from any section of our readers, young, old, or middle-aged, and to defend our rights, and offer explanations—for the sake of appearances, which, however, must be taken as sufficient ones—

for all we have said or done during the past year, or for all we have left unsaid and undone, according to editorial privileges in such cases made and provided. Far be it from our desire to cork down the effervescence of any frothy reader who may have just cause of complaint against us, for we would gladly hear him fiz out his grievances, inasmuch as his squeak may do us some good, although it cannot do us much harm; and we would willingly profit even by him who is thoroughly obfuscated."—*From the Leading Article of the* ENGINEER, *of Jan. 1st,* 1858.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

SCHMERSAHL, A. E. *Improvements in treating bones for the purpose of obtaining gelatine, size, or glue, and in obtaining certain useful products from such treatment.* Dated Apr. 3, 1857. (No. 1040.)

The patentee separates from bones, blood and other substances soluble in water, so as to deprive them of putrescent matters, and then treats them with an acid, to dissolve the phosphate of lime, leaving the gelatine in a solid state, which, after being washed, may be used as an article of commerce, or boiled into a paste or jelly, ready for use. The liquor in which the bones have been macerated he reserves, and extracts therefrom phosphorus or salammoniac, and superphosphate of lime.

BROOMAN, R. A. *A method of, and apparatus for, disinfecting alcohol, or for separating essential oils therefrom.* (A communication.) Dated Apr. 13, 1857. (No. 1042.)

This invention consists in treating alcohols with, or exposing them to the action of, a fatty body, whereby the essential oils contained in them, having a greater affinity for fatty bodies than for the alcohols, and being more soluble in them, become separated from the alcohols and retained by the fatty body. The invention includes suitable apparatus for carrying the above treatment into effect.

BARLOW, C. *Consuming the smoke and gases of furnaces, and at the same time furnishing a hot air blast, being a smoke and gas consuming hot air blast furnace.* (A communication.) Dated Apr. 13, 1857. (No. 1045.)

This consists in the use of mechanism, by which the smoke and gases that generally pass off through the chimney are withdrawn from the flue, thoroughly mixed with abundant supplies of highly-heated air, and then forced under and through the fire, and in rendering the mechanism self-adjusting by the pressure of steam in the boiler.

M'FARLANE, P. *Improvements in looms for weaving.* Dated Apr. 13, 1857. (No. 1046.)

This consists in arrangements by which a loom is made to supply its shuttle or shuttles with fresh weft when that last placed in the shuttle or shuttles has become broken or exhausted; in arrangements for stopping a loom when any definite number of warp threads have broken; and in arrangements for indicating and calling attention to the requirements of each of a number of looms by certain signals.

RAMSBOTTOM, J. *Improvements in wrought iron railway chairs, and in machinery for manufacturing the same and other articles.* Dated Apr. 13, 1857. (No. 1047.)

This consists—1. In a wrought iron railway chair, having a wedge-shaped piece between the jaws into which are fitted the rail and wedge-shaped packing pieces, or the rail alone, when of suitable section, the elasticity of the chair securing the rail. 2. In imparting a reciprocating and revolving motion to circular saws. It cannot be fully described without engravings.

HAZARD, R. *An improved heat extractor.* Dated Apr. 14, 1857. (No. 1048.)

This heat extractor consists of two parts —one for arresting the heat contained in the smoke gases, &c., which are usually allowed to pass off through chimneys; the other branch consisting of a separate fire. The object is effected by conveying the gaseous products of combustion through pipes forming the extractor, which will become heated, and on a current of cold air passing around their outer surfaces the heat will be taken up and carried off.

WICKS, P., and T. G. GHISLIN. *Superseding the use of bristles, cocoa fibres, flax, hemp, whalebone, &c., to be styled and called an invention for adapting and applying the fibrous plants of South Africa for the purposes of manufacture.* Dated Apr. 14, 1857. (No. 1049.)

This consists in the preparation of the fibrous plants of South Africa "by any mode or modes," and also the manufacturing of them for various uses and purposes "by any mode or modes."

RUBERY, J. *Improvements in the manufacture of umbrella and parasol ribs.* Dated Apr. 14, 1857. (No. 1051.)

This consists in making such ribs by means of dies, which form at one time the knob and flat part near the knob at the end of the one rib, and also the flat part at the

top notch and of another rib. Working together with the first dies are other dies which, at the same time, make an indentation in the middle of the rib to receive the middle, but to which the stretcher is jointed.

HARRISON, T. *New or improved machinery for the manufacture of wooden pill-boxes, match-boxes, and other such-like articles.* Dated Apr. 14, 1857. (No. 1052.)

This invention cannot be described without engravings.

BROOMAN, R. A. *Improvements in machinery for mixing, solidifying, pressing, and moulding.* (A communication.) Dated Apr. 14, 1857. (No. 1053.)

The patentee claims—1. The combination of an endless chain or belt carrying buckets for raising small coal, &c., with a steam-tight or other mixing trough. 2. The mixing with the small coal, &c., of pitch, or other analogous material, and treating the mixture by steam. 3. The method of working the radial plungers of moulding apparatuses by means of a crank, loose collar, and connecting links.

ALDBOROUGH, Earl of. *Improvements in aërial navigation, and in the apparatus connected therewith, parts of which are applicable to locomotion generally.* Dated Apr. 14, 1857. (No. 1054.)

The invention, which chiefly consists of improvements upon former patents of the Earl of Aldborough, cannot be described without engravings.

KNOWLES, R. *Certain improvements in machinery or apparatus for winding yarn.* Dated Apr. 14, 1857. (No. 1055.)

This relates to "pin winding machines," employed for winding yarns upon pin bobbins for weaving, the object being the more even and perfect winding of the yarn upon such bobbins. It consists in an arrangement of "cone pulleys," so applied as to regulate the speed of the bobbin, and with it the movement of the copping rail as the yarn is wound upon the greater or lessor diameter of the conical surface of the pin bobbin, or in accordance with its varying diameter.

JOHNSON, J. H. *Improvements in apparatus for generating and superheating steam.* (A communication.) Dated Apr. 14, 1857. (No. 1056.)

This invention chiefly consists of certain arrangements of zigzag pipes in the furnace flues, through which pipes the steam is passed on its way to the boiler.

NEWTON, A. V. *Improvements in carding engines.* (A communication.) Dated Apr. 14, 1857. (No. 1059.)

This invention cannot be described without engravings.

NEWTON, W. E. *Improved means of lighting gas for illuminating and other purposes.* (A communication.) Dated Apr. 14, 1857. (No. 1060.)

The object here is to light the gas lights employed in a public building or district simultaneously. It is effected by means of electricity passed through conductors of wire coiled up near the orifice of each of the burners. The lights are also to be regulated by electro-magnetic apparatus.

WILLIS, H. *Improved machinery for supplying air to organs and free reed instruments.* Dated Apr. 14, 1857. (No. 1061.)

The chief object here is to supply by hydraulic power a continuous blast of air to the bellows of such instruments. This is effected by a pair of hydraulic engines, the piston rods of which are connected to feeders constructed by preference on the principle of the accordion bellows.

KNOWLES, R. *Certain improvements in power looms for weaving.* Dated Apr. 15, 1857. (No. 1062.)

The patentee claims—1st. The use of change wheels acting upon the spring handle of the loom for stopping the action of the loom at certain required intervals thus regulated. 2. The application of a radial rod and connected apparatus to the "taking up" motion for "letting back" the fabric from the cloth roller.

BARNETT, L. *Improvements in the making and cutting out of garments.* Dated Apr. 15, 1857. (No. 1064.)

This consists in methods of cutting the materials of such shape as to have fewer seams than garments as heretofore made.

NEWTON, A. V. *Improved apparatus for taking the measurement of coats and other garments.* (A communication.) Dated Apr. 16, 1857. (No. 1065.)

This invention cannot be described without engravings.

BRUNEL, B. F. *Improvements in raising sunken vessels and other submerged structures and articles, and in machinery and apparatus employed therein.* Dated Apr. 15, 1857. (No. 1067.)

This consists in raising sunken vessels by filling them with hydrogen gas, where the cabins are capable of holding the gas, or raising such as are not capable of holding the gas, and other submerged articles, by means of gas-holders connected to them. The invention includes certain apparatus to be employed for the purpose.

PAYNE, J. *Improvements in scythes.* Dated Apr. 15, 1857. (No. 1068.)

The snaith of the improved scythe is of the duplex kind—that is to say, it is forked for the convenience of holding during work-

ing. The length of handle next the scythe-blade is curved at the part where it joins the blade, and the other length springs at an angle from the concavity of this curvature. The actual handles grasped by the mower are attached one to each length of the main handle, and at the upper ends thereof, and these short handles are minutely adjustable as to their vertical angles of position, by means of screw-clipping holders.

RICHARDSON, T., and M. PRENTICE. *Improvements in the manufacture of manure.* Dated Apr. 15, 1857. (No. 1069.)

The per centage of carbonate of lime in any material containing earthy phosphates is ascertained by analysis. The material is reduced to powder, and agitated in dilute muriatic acid; any phosphate of lime which may be dissolved is precipitated by lime water. After settling, the supernatant liquor is syphoned off, and the residuum washed, when it may be used in the manufacture of super-phosphate; or it may be heated to redness, and employed as a substitute for the rich earthy phosphates. The patentees boil animal matter in a solution of soda salts ("red liquor"), or of alkaline salt, and when reduced by boiling to a paste, add saw-dust, cobb, cosh, or similar drying materials. They connect with any source of waste heat a vessel, in which they mix a phosphatic material, free from animal matter, with its equivalent of sulphuric or muriatic acid, until the decomposition has been effected. The mixture is conveyed to a reverberatory furnace, and the water evaporated until the mass becomes thick, when the above preparation of animal matter is added, or some of the dryers mentioned.

SAFRAN, J. *Improvements in locking or fastening combinations of drawers in chests, tables, nests, or otherwise.* Dated Apr. 15, 1857. (No. 1070.)

This relates to a method of fastening the whole of the drawers by the shutting or locking of one of their number, which is principally applicable to pedestal writing tables.

SUDBURY, J., and A. W. LINSELL. *An improved gas-regulator.* Dated Apr. 16, 1857. (No. 1072.)

This invention is described at page 38 of this Number.

SUGDEN, T. and F. *Improvements in sewing machines.* Dated Apr. 16, 1857. (No. 1074.)

This relates to sewing machines which form the chain stitch. Instead of employing a partially circular or straight needle for the under thread, the patentees employ a bent needle somewhat resembling the letter L, having an oscillating or to-and-fro motion imparted to it, either transversely or parallel with the advance of the work. The needle consists of two parts, one resembling the other, with the exception of the eye, which is only in one of the parts. The invention also includes an improved feeding motion and means for giving the vertical needle of circular needle machines a forward and backward motion.

WEILD, W. *Improved arrangements for printing, dyeing, colouring, or straining and otherwise preparing yarns or threads for various manufacturing purposes.* Dated Apr. 16, 1857. (No. 1076.)

This relates—1st. To means for giving uniform tension to the yarns or threads to be coloured, and consists in causing a fixed and uniform weight to act upon each thread, between the bobbin or swift from which the thread is withdrawn and the drum or swift upon which it is wound. 2. It relates to means for limiting each colour or shade of colour, or for preventing adjoining colours from spreading or running into each other. These objects are effected by fixing clamps, pincers, or straight edges upon the threads previous to the application of the colour at those points where one colour is to commence and another is to terminate.

HINDLE, R. *Improvements in that apparatus used in calico and other printing known as the sieve.* Dated Apr. 16, 1857. (No. 1077.)

This consists in causing the "sieve cloth" to rest on an even plane surface, having channels cut in to allow of the free circulation of the colour to supply the sieve cloth, the narrow supporting surfaces presenting no perceptible obstruction to the flow of the colour to those parts of the sieve cloth immediately in contact with them.

SCOWEN, T. L. *The horizontal fin-expanding canopy for carriages, boats, and places.* Dated Apr. 16, 1857. (No. 1078.)

This consists of jointed standards, attached or not, to the carriages, boats, &c., on which the framework of canopy, consisting of a centre rail of wood or iron, is attached and supported, and to this centre rail are attached ribs which expand according to the shape of the canopy. The framework, when collapsed and let down with the jointed attached standards, will form a back rail to a double seat, such as seats on roofs of omnibuses, or on boats, &c., and can be raised up and horizontally expanded over the entire roof or place intended to be covered.

WARBURTON, J. *Improvements in preparing and combing wool and other fibres.* Dated Apr. 16, 1857. (No. 1080.)

These are applicable when using circular

or endless combs, and two or more such combs are combined and work together in the same machine. For these purposes, when using two circular combs of like diameter, with teeth set at right angles to the planes of the circles, the peripheries of the two combs are arranged to meet or come together at one point, and they are caused to revolve in planes inclined to each other, the teeth of the two combs being arranged to point in opposite directions. Suitable feeding and drawing off apparatus are applied to each of the two combs. By this combination, the fibres being fed into each of the combs, the teeth of the two combs, where the combs come together, penetrate the fibre contained in each other's combs, and then by separating they comb out the fibres, and the same are drawn off into two slivers and from each comb by their respective drawing-off apparatus.

HANDS, J. *Improvements in kilns and in furnaces and flues, for withdrawing air and vapours from drying and other chambers.* Dated Apr. 16, 1857. (No. 1081.)

This invention cannot be described without engravings.

WARBURTON, J. *Improvements in carding machinery.* Dated Apr. 16, 1857. (No. 1082.)

Opposite each part of a card cylinder where it is desired to have a stationary working card surface, there is an axis on which is fixed a barrel or frame with several sides, and on each side is fixed a card surface suitable for acting as a fixed or stationary card surface. The axles of these barrels are at intervals caused to move round a distance equal to that required to bring a fresh card surface of each barrel into position to work the card cylinder, and thus, from time to time, to change the otherwise stationary card surfaces working with the card cylinder.

WARBURTON, J. *Improvements in preparing and combing wool and other fibres.* Dated Apr. 16, 1857. (No. 1084.)

Two circular or endless combs, having teeth on their peripheries, are so combined that they incline to each other, and revolve in two different planes, by which the teeth of the two combs constantly come together at one point. Tufts of fibre are fed into the teeth where they come together, and as the peripheries separate and divide the fibres between them, the teeth of two other combs are interposed, so that as the fibres are by the separation of the two combs robbed from each others' teeth they will be drawn through between the teeth of the interposed combs; and in order that the fibres may be effectually treated, the back rows of the teeth of the two first combs where the tufts of fibre are fed into them are made moveable, and so that they may go out of action, and leave the fibres as the fixed teeth of the same combs separate from each other, and thereby comb out the fibres held in each other's teeth. The fibres having been thus combed are drawn off by suitable apparatus into slivers from each of the first combs.

FONTAINEMOREAU, P. A. L. DE. *An improved truck apparatus for moving and transporting stones and other heavy bodies.* (A communication.) Dated Apr. 16, 1857. (No. 1086.)

This apparatus is composed mainly of two supporting rollers and a frame, these rollers being one in advance of the other, and each being of the form of a double truncated cone.

SCHAUB, G. *A new or improved manufacture of types for printing.* Dated Apr. 16, 1857. (No. 1087.)

This consists in certain methods of manufacturing types for printing, by casting the stems or bodies of the types at the back of type heads, and finishing the same.

OLDFIELD, E. *Improvements in self-acting mules for spinning and doubling.* (Partly a communication.) Dated Apr. 17, 1857. (No. 1088.)

This consists—1st. In moving the friction bowl of such mules towards the iron contact pulley on the cam shaft, thereby allowing the cam shaft to revolve in fixed bearings. 2. In a mode of constructing the friction bowl that works the contact pulley. 3. In a mode of shortening the backing-off motion.

CAILLAUD, J. M. L. *Improvements in removing the fur from the skins of rabbits, and in preparing rabbit, calf, and other skins for tanning.* Dated Apr. 17, 1857. (No. 1090.)

For loosening the fur from the skins of rabbits, quick lime and red orpiment are mixed with water, and spread on the flesh side of the skins. These skins—or horse, calf, or other such skins unhaired as usual—are then subjected to lime in water, and having been cleaned from the lime, they are subjected to a solution of carbonate of potash, to facilitate the removal of fat. In some cases liquid ammonia is used to skins where they are hard or stiff. The skins are then subjected to a solution of potash, or soda, and when thus prepared are tanned by soaking in bark liquor.

ARTHUR, G. *Improvements in the manufacture or production of bricks, tiles, and other articles of earthenware.* Dated Apr. 17, 1857. (No. 1091.)

Clay is taken from the earth, disintegrated by knives in a cylinder, through which it is sifted on to a belt, which leads

it away to certain moulding machinery, which moulds it under great pressure, whence it is delivered to be burnt, or to be used without burning in some cases.

HARRIS, T. *Certain improvements in the mode of constructing and applying horse shoes.* Dated Apr. 18, 1857. (No. 1094.)

This is mainly applicable to horses with tender or diseased feet, and consists in methods of connecting horse shoes by means of leather straps.

GRANVILLE, W. H. D. *Improvements in fire-arms, and in the means of loading the same.* Dated Apr. 18, 1857. (No. 1098.)

The object here is to produce a fire-arm capable of being discharged and recharged many times without the loss of time consequent upon loading after every fire in the ordinary manner. It requires engravings to illustrate the invention.

DEANE, H. D. *Improvements in the floats or paddle-boards of paddle-wheels.* Dated Apr. 18, 1857. (No. 1099.)

This consists in perforating floats or paddle-boards with holes tapering from the side of the float which first strikes the water. The diameter of the perforation should be about the thickness of the float, tapering to about one-half of such length. The advantages of the invention are said to be:—That the water lifted up by the ordinary floats, which is called the back-water, passes through the perforations of the floats, and so supplies a body of water for each succeeding float to act upon. Also the water passing through the perforations fills up instantaneously the hollow caused by the float passing through the water.

HEALD, H. *An improved method of packing pickers employed in looms.* Dated Apr. 18, 1857. (No. 1101.)

This method was described at page 151 of No. 1775.

BARNES, C. R. *Improvements in means for hulling and cleaning rice and other grains having a hull or husk.* Dated Apr. 18, 1857. (No. 1102.)

This consists in dressing the hulling stones, so that the grains are prevented from escaping in a radial line, and are thereby turned up on their longest diameter, and exposed to a rolling and beating operation that effectually removes all the hull or husk. The patentee also makes use of a three-armed ball, to adjust and tram the running-stone with great accuracy, in order that the hulling operation may be uniform all around the stone. The grains and hulls pass away through an ascending current of air, which winnows the same, carrying away the hulls and any broken pieces of grain or chess, and the said broken grain or chess are caught and retained by a peculiarly constructed deflector.

NORMAND, C. B. *Improvements in generating motive power by the employment of heated air, steam, and gases.* Dated Apr. 18, 1857. (No. 1103.)

This invention cannot be described without engravings.

SANDERSON, T. *Improvements in wheeled carriages.* Dated Apr. 20, 1857. (No. 1105.)

The body of the carriage is connected to the springs so as to be capable of resting thereon, and the springs have their bearing on the shafts (or their connexions), which, together with the springs, are connected to the axle. The springs may also be made to rest on the axle, the shafts being separately connected to the axle.

THOMSON, W. *Improvements in stoves or heating apparatus.* Dated Apr. 20, 1857. (No. 1109.)

This relates to the use of gas for heating water so as to render the heating apparatus available for heating or warming buildings of all kinds. Under one modification of the apparatus used, the stove is in the form of a vertical cylindrical pillar, having a flat expanded circular top, the gas burner being in the base.

TINDALL, R., jun. *Improvements in harpoon guns and ammunition.* Dated Apr. 20, 1857. (No. 1110.)

This relates to improvements in harpoon guns used in the whale fishery, and in the ammunition to be used therewith. The objects are—the obtainment of precision in firing, non-liability to derangement, holding the fish in whatever position the (expanding) harpoon is lodged, and increased efficiency by the combination of a bomb with the harpoon. It includes several detailed improvements.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

SEARLE, T. J. *Improvements in fastenings for window-shutters.* Dated Apr. 13, 1857. (No. 1034.)

These consist in the use of a curved bolt describing part of a circle, and travelling in a similarly-shaped chamber raised on a metal disc. The bolt passes partly into a corresponding chamber, thus fastening the sash frames together.

RATCLIFF, J. and E. *An improved mode or modes of adjusting chandeliers.* Dated Apr. 13, 1857. (No. 1037.)

These consist in the use of a male and female screw applied to that part of the chandelier that usually slides the one in the

other, in order to dispense with weights and pulleys.

GOODYEAR, C. *Improvements in the manufacture of life-preserving apparel and other buoyant pliant articles.* Dated Apr. 13, 1857. (No. 1038.)

The inventor makes articles of two thicknesses of india-rubber cloth, which he cements at the edges, and at parts of their inner surfaces, so as to form air cells, into which he introduces coiled metal springs, through which a tuft of wool or worsted is drawn, and then spread out to form a kind of pad at each end.

READING, D. *An apparatus for ventilating and increasing the draught in fire-places and flues.* Dated Apr. 13, 1857. (No. 1041.)

This consists in forming a communicating passage (by pipes or otherwise) between the apartments to be ventilated and the flue or fire-place of the room above it, whereby the vitiated air is carried away, and passed above or below the fire.

BEAUMESNIL, P. V., and C. ERHARD. *A new and improved system of wheels for railway and other carriages.* Dated Apr. 13, 1857. (No. 1043.)

Here each spoke is made in two parts, one fixed to the felloe and the other to the nave, and the two parts are connected by a pin on one passing through a slot in the other.

POTTER, T. G. *An apparatus for day and night advertising.* Dated Apr. 13, 1857. (No. 1044.)

The inventor forms apertures in shutters, doors, &c., and inserts therein glass, talc, &c., on which the advertisement is to be printed, or otherwise made visible. Behind this surface a gas burner is adjusted, and so constructed that the gas may be turned off by a clock releasing a weight.

LAVIGNE, C. J. M. *Improvements in machines or apparatus for swinging, see-sawing, revolving, and for performing other exercises or amusements in the air.* Dated Apr. 14, 1857. (No. 1050.)

The inventor mounts the axis of see-saws on a pillar free to rotate, and furnished with a crank which regulates the motion of the see-saw. Masts and sails are raised from the ends of the see-saw to steady the motion. In vertical machines, rotating on a horizontal axis, the cars or wood horses carrying the players are counterbalanced by weights traversing towards or from the axis as required. The inventor steadies the motion of these machines by sails or balloons inflated. Another machine performs a rotary motion, but has its axis inclined to the horizon. In form it is somewhat like the stem and ribs of an expanded umbrella, supposing the stem to be the inclined axis. The cars or wood horses carrying the players are suspended from the points of the ribs, and when it rotates move in a plane considerably inclined.

JOHNSON, J. H. *Improvements in machinery or apparatus for raising and forcing fluids.* Dated Apr. 14, 1857. (No. 1057.)

This invention consists of an apparatus which cannot be intelligibly described without illustrations.

JOHNSON, J. H. *Improvements in fire-arms.* (A communication.) Dated Apr. 14, 1857. (No. 1058.)

This relates to the locks of fire-arms. It consists in the use in the free end of the main spring of the lock of a small anti-friction roller, which runs along the cams fixed to the axis of the hammer, in place of the plain end of the spring rubbing against it.

COUTTS, J. *An improved method of uniting together the parts of all kinds of floating bodies composed of metallic substances, as well as vessels for containing fluids, gases, &c.* Apr. 15, 1857. (No. 1063.)

This consists in the use of an elastic substance such as vulcanised india rubber, &c., which the inventor places between the points of junction of the metallic lamina or substances which it is desired to unite. He proposes, also, to cover the heads and shanks of the bolts or rivets with a plastic substance, that can, when in a liquid state, be readily applied before they are inserted in their places. He also employs an elastic washer around the bolts, which is compressed against the metal to be united by pressure from a screwed nut fitting upon the bolt.

GOODYEAR, C., jun. *An improved manufacture of paper-knife.* Dated Apr. 15, 1857. (No. 1066.)

The object here is to combine in one instrument a paper-knife and book-marker. Instead of rivetting a projecting tongue to the handle of the knife, it is proposed to stamp or cut out a tongue in the handle of the paper-knife, which tongue is reduced in thickness to give it the required elasticity.

LEUILLET, J. B. *Improvements in binding account and other books.* Dated Apr. 15, 1857. (No. 1071.)

Here a whalebone is placed in pieces near the top and bottom of the book back, and serves as a spring in opening or shutting the book. It embraces the outside of the back, and is secured to the main part of the back, and to the boards or sides.

RAGGETT, G. *Improvements in railway breaks and carriages.* (A communication.) Dated Apr. 16, 1857. (No. 1073.)

The inventor applies his breaks directly to the top of the wheel, and the whole apparatus is above the truck frame. This takes its leverage or lifting hold of the axle box or its equivalent, and not the truck frame, and forms an uniform rigid retarding power, while it leaves the truck springs to their full effect.

CROOK, S. T. *Improvements in the mode or method of manufacturing iron retorts, safes, cisterns, ovens, boilers, chests, and other similar articles of iron manufacture.* Dated Apr. 16, 1857. (No. 1075.)

The inventor proposes to weld sheets of wrought or malleable iron together to the required shape, size, or configuration, for retorts, safes, or similar purposes.

SHERWOOD, I., and J. B. WAYNE. *Improvements in certain apparatus to be attached to vehicles for the purpose of acting as a check upon the drivers or conductors of such vehicles, by indicating the number of passengers carried and the distance each has travelled.* Dated Apr. 16, 1857. (No. 1079.)

This consists in fixing upon a vehicle a small worm wheel, so that by the revolution of the wheels a pointer or pencil can be made to mark on a disc or dial certain lines or points that will indicate the distance the passenger may have travelled.

NEWINGTON, S. *Improvements in structures for growing grapes and other fruit.* Dated Apr. 16, 1857. (No. 1083.)

A straight furrow, about one foot deep, is dug, the earth that comes out being thrown on to the sides, so as to cause the furrow to be about 18 ins. deep in the centre. The furrow is formed with inclined sides, and about 9 ins. wide at the bottom, and 3 ft. at the surface. The bottom is paved with porous material, the sides with slate, tile, brick, &c. The inventor employs a roof, the ridge of which is formed of iron, having inclines on both sides moulded with grooves for fitting in sheets of glass.

SMITH, W. *A smoke-consuming furnace.* (A communication.) Dated Apr. 16, 1857. (No. 1085.)

A circular frame is mounted on a pillar in the ash-pit, or under the boiler, copper, &c. Upon this frame a set of fire-bars, divided in their length into two parts, are fitted, so that upon turning the frame round one set of bars are presented, upon which the fuel is deposited, which, when incandescent, is, by the furnace being again turned, changed from the front to the back part of the furnace. Over the centre of the revolving grate, and projecting from the bottom of the boiler, a bridge is formed of fire bricks; or a hollow cast-iron trunk, tube, or deflector may span the furnace and aid in supporting the boiler, and this hollow bridge piece may be perforated with holes for the admission of air into the furnace.

MESSENGER, S., and T. FLETCHER. *Certain improvements in gas-burners.* Dated Apr. 17, 1857. (No. 1089.)

The inventor so divides the flame by means of discs, &c., that it shall issue from the burners in very thin films, which may be so formed around the burner as to present the forms of leaves curving outward and upward, to correspond with globular glasses, for which they are applicable.

SMITH, J. *Improvements in the manufacture of carpets.* Dated Apr. 18, 1857. (No. 1092.)

This consists in causing the wefts (woven in power-looms), which bind the rows of pile loops, to be more effectually embodied and hidden within the fabric; to effect which object the inventor causes an additional vibrating roller (round which the warp is passed from the usual vibrating roller in connexion with the letting-off motion) to be employed, so as to supply the requisite tension to the linen or binding warp at the time of the beating up of the lay, the said roller being actuated by a cam and lever for that purpose, and so arranged as to admit of an increase of tension being applied to the back or front wefts as required.

DUHAMEL, H., jun. *Improvements in the fabrication of glass.* Dated Apr. 18, 1857. (No. 1093.)

This relates to the construction of furnaces for manufacturing all descriptions of glass, and consists in having them arranged so as to do away with the open space, which in the glass furnaces hitherto used exists in the central part of the same between the pots.

WYLIE, J. *Improvements in pianofortes.* Dated Apr. 18, 1857. (No. 1095.)

This consists of detailed improvements in the "action" of cottage and cabinet or upright pianofortes, the object being to simplify the parts, and render the movement more effective than hitherto.

BRANDON, D. H. *Improvements in fastenings for shutters, windows, doors, &c.* (A communication.) Dated Apr. 18, 1857. (No. 1096.)

This consists in the use of a bolt provided with a head on the external end, and a slotted hole on the internal end. To secure the bolt immediately on its being inserted, the inventor tapers its point, both on the upper and lower face, and fixes on the face of the wall, inside the building,

a plate provided with a sliding cottar pin, and the outer one with a slide or button connected with such cottar pin.

DAVIES, G. *Improvements in the method of laying underground telegraphic wires.* (A communication.) Dated Apr. 18, 1857. (No. 1097.)

This consists, 1st, in placing such telegraphic wires in grooves in wooden rails, or in sheet metal, and then filling the grooves with liquid bitumen, to protect and isolate them completely; and also in filling with bitumen the space between each of the grooved rails after they have been laid; 2d, in leaving a space between the ends of each rail, which allows of their being folded up to afford facility for transporting a great length of wires ready for use.

JAHN, G. *Improvements in revolver fire-arms.* Dated Apr. 18, 1857. (No. 1100.)

This consists in so constructing revolver fire-arms, that the charges in the chambers or short revolving barrels may be exploded by a needle fixed on a hammer or lever turning on an axis near one of its ends. This needle enters the chambers, and comes in contact with an explosive material in connexion with the cartridge.

STURGES, R. F. *A new or improved manufacture of metallic pen.* Dated Apr. 20, 1857. (No. 1106.)

This consists in making pens of the metal aluminium, or of alloys containing aluminium.

MARTIN, J. C. *An improvement in the manufacture of paper.* Dated Apr. 20, 1857. (No. 1107.)

This consists, 1st, in preventing the creasing to which paper is liable in the web or length during the process of rolling or glazing; 2d, in rolling and glazing a wide web of paper in its passage from the drying cylinders to the cutting machine, by an arrangement of short rolls, which are liable to spring or drop towards the middle of their length.

JARVIS, J. S. *An improvement in the manufacture of stocks or ties for the neck.* Dated Apr. 20, 1857. (No. 1111.)

This consists in attaching two side pieces, or bands, at an angle to the bow, which appears in front when the tie is in wear. The free end of one side piece is furnished with a button, while the free end of the other piece carries a loop, whereby to fasten the tie at the back of the neck.

PROVISIONAL PROTECTIONS.

Dated October 19, 1857.

2666. Jean Schmidt, of Kernsback, engineer. An improved method of making tyres for railway wheels.

Dated November 3, 1857.

2786. Peter Armand Le Comte de Fontaine Moreau, of Paris. Improvements in marine or condensing steam engines. A communication.

Dated December 10, 1857.

3050. Richard Reeves Cox, of Kentish-town. Improvements in the manufacture of fire lighters, and in apparatus or stoves for burning the same.

Dated December 11, 1857.

3056. John Gedge, of Wellington-street South, Strand. Improvements in the process of rectifying liquids, and in the apparatus used therewith. A communication from R. Minodier, of Paris.

Dated December 16, 1857.

3086. John Francis Seeley, of Everett-street, Brunswick-square, boot maker. An improved machine or apparatus for cutting out materials used in the manufacture of boots, shoes, and other coverings for the feet.

3090. Matthew Semple, of Stonehouse, Esq. Improvements in preserving meat, fruit, vegetables, and other edible substances and fluids.

3092. Henry Gregory, of Manchester, agent. Certain improvements in machinery or apparatus for making "lozenges," or other similar articles.

3094. James Joseph Cregeen, of Plough-road, Rotherhithe, Doctor of Medicine. Improvements in the treatment of India and China grass, pineapple, hemp, flax, and other similar fibrous materials, and in the machinery or apparatus employed therein.

Dated December 17, 1857.

3098. John James Davis, of Percival-street, Clerkenwell, die sinker. Improvements in presses for printing or endorsing and embossing.

3102. Henry Johnson, of Crutched Friars, City. Improvements in apparatus for drawing geometric curves.

3104. William Woofe, of Tetbury, Gloucester, agricultural implement maker. Improvements in ploughs.

3106. John Henry Johnson, of Lincoln's-inn-fields. Improvements in machinery or apparatus for hulling cotton and other oleaginous seeds, applicable also to the hulling of cereals. A communication from C. T. Laborey, of Paris.

Dated December 18, 1857.

3108. John Horace Taylor, of the Victoria Dock-road, engineer, and Robert Tate Barrett, of the same place, gentleman. Improvements in apparatus for the prevention of smoke and for effecting a better combustion of fuel in steam boiler furnaces.

3110. Thomas Coxon Wilkinson, of Ashford, Kent, engineer. Improvements in pump valves.

PATENT APPLIED FOR WITH COMPLETE SPECIFICATION.

3175. James Cottrill, of Studley, Warwick, needle manufacturer. Improvements in the manufacture of certain descriptions of needles. Dated 28th December, 1857.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," January* 5, 1858.)

2216. D. Messmore. An improved method of dressing mill stones for hulling rice and other grain having hulls or husks. A communication.
2223. H. Cartwright. Improvements in the construction of steam engines.
2236. G. D. Davis. Improvements in the construction and in the method of working windlasses.
2243. J. Gedge. Improvements in envelopes for letters and other documents. A communication.
2244. E. Riley. Improvements in looms.
2248. H. Parry. Improvements in the construction of rails for railways or tramways.
2256. J. Gedge. Improvements in the manufacture of soap. A communication.
2264. J. Webb. An improved hopper.
2268. C. Thompson and J. Thompson. Improvements in apparatus for discharging condensed water, air, or other fluids from steam pipes, drying cylinders, and other apparatus where steam is used.
2271. R. Aytoun. Improvements in safety cages, or apparatus for mines.
2274. J. D. Brady. Improvements in saddles.
2278. G. Cumming. Improvements in apparatus for thermometric, hygrometric, and barometric purposes.
2293. G. W. Lenox. Improvements in apparatus for sounding alarums at sea.
2297. E. Grenet, jun., and A. Vavin. An improved electro-magnetic machine.
2306. T. Jackson. Improvements in the action of pianofortes.
2307. J. R. Atha, W. Pearson, and W. Spurr. Improvements in railway signals.
2313. T. Petitjean. An improved method of obtaining aluminium and magnesium.
2322. R. Johnson. Certain improvements in purifying and filtering water.
2325. W. E. Newton. Improvements in the manufacture of a composition to be employed in the preparation of pigments. A communication.
2333. W. Sellers. Improvements in boring or turning mills for operating in metals or stone.
2335. C. J. Duméry. Improvements in smoke-preventing apparatus.
2341. B. Sharpe. Improvements in electric telegraph cables, and in the apparatus used for paying out such cables.
2360. W. Clark. Improvements in Jacquard apparatus, and in the pattern surfaces of such apparatus. A communication.
2367. J. Mills. Certain improvements in the manufacture of keys, tapered pins, split pins, and other similar articles employed in the construction of machinery.
2395. T. S. Adshead, and J. Platt. Certain improvements in machinery for carding cotton and other fibrous materials.
2443. P. F. Joly. Improvements in apparatus for generating and superheating steam.
2737. W. Clark. Certain improvements in machinery for carding cotton, wool, and other fibrous substances. A communication.
2777. G. H. and H. R. Cottam. Improvements in stable fittings.
3003. C. Henwood. An improved arrangement of galvanic battery suitable for medical purposes.
3009. J. Rubery. Certain improvements in the manufacture of umbrellas and parasols, and in the application of a new condition of material to the production of some of the parts thereof that has not heretofore been used for that purpose.
3025. D. Hiley, P. Hiley, W. Hargreaves, and E. Haley. Improvements in power looms for weaving worsted, cotton, silk, woollen, and other fibrous substances.
3080. E. Turner, and J. C. Pearce. Improvements in the manufacture of railway wheels.
3100. J. E. Barton. An improvement in winding worsted on to the creel bobbins of carpet looms.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

1854.

2759. George Edward Dering.
2760. Robert Sam North.
2761. Thomas Slater and Joseph Tall.

1855.

10. Claude Jules Fincken.
21. Alexander Southwood Stocker and Samuel Darling.
25. George Walker Muir.

LIST OF SEALED PATENTS.

Sealed January 1st, 1858.

871. John James Russell.
1834. Carl Johann Lawrence Leffler.
1835. William Edward Newton.
1839. Edouard Beckman Olofson.
1846. George Davies.
1848. Tomyns Browne.
1852. Jean Baptiste Meeus.
1859. Henry D. Mears and William Houlton.
1861. William Thoms Hendry and Robert Henry Hancock.
1863. Thomas Royds, Thomas Roscow, and James Lord.
1867. George Cooper.
1870. John Smith.
1883. Peter Hippolyte Gustave Bérard.
1884. Peter Hippolyte Gustave Bérard.
1886. William Smith.
1888. Richard Archibald Brooman.
1891. Michael Henry.
1896. Jules Joseph Henri Brianchon.
1914. Thomas Lewis, Henry Parrish, and Robert Martin Roberts.
1933. Datus Ensign Rugg.
1938. Hippolyte Lamy.
1946. William Edward Newton.
1947. William Edward Newton.
1950. Samuel Nye.
1969. John Henry Johnson.
1970. Henry Blandford.
1971. John Henry Johnson.
1994. William Edward Newton.
1997. George John Newbery.
2003. William Edward Newton.
2021. Moses Clark and George Bertram.
2056. Robert Jackson.
2270. John Henry Christian Löbnitz and James McLintock Henderson.
2377. Isidore Charles Cloet.
2393. Adrien Jules Alexis Dumoulin.
2401. Alphonse Réne le Mire de Normandy and Edward Thornhill Simpson.
2503. John Charles Pearce.
2561. Conrad William Finzel and James Bryant.

Sealed January 5th, 1858.

1874. Charles Faulkner and David Faulkner.
1889. William Burgess.
1894. George Green.
1897. Joseph Gibbs.
1906. John Holley Swan.
1908. John Julius Cléro de Clerville.
1912. William Mann.
1919. Isac Louis Pulvermacher.
1921. Sir Francis Charles Knowles.

1922. Richard Archibald Brooman.
1931. Edouard Primard.
1932. William John Thomas Smith and Frederick Talbot.
1981. Joseph Russell, Henry William Spratt, and William Press.
1992. George James Wainwright and Charles Timothy Bradbury.
1998. Frederick Hall Holmes.
2016. Alfred Vincent Newton.
2090. John Beale.
2531. Peter Kerr.
2853. James Stevenson.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICES TO CORRESPONDENTS.

W. Carroll. We cannot give place to further correspondence upon the subject of your letter.

Several articles and letters are standing over for want of space.

We are unable to take any further notice of the numerous letters lately received respecting the launch of the "Leviathan" than has been taken in the article appearing in this Number.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

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MANN'S PATENT SAFETY APPARATUS FOR STEAM BOILERS.

Fig. 2.

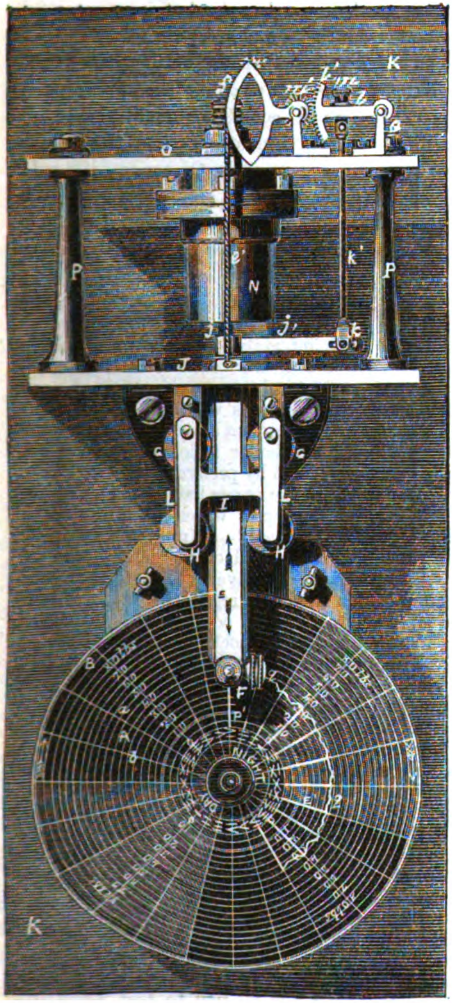
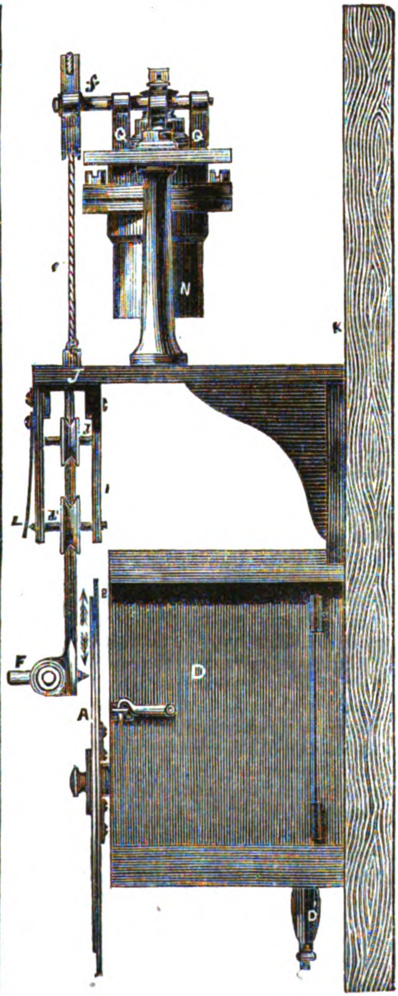


Fig. 3.



MANN'S PATENT SAFETY APPARATUS FOR STEAM BOILERS.

In every discussion which has taken place of late years respecting the prevention of steam boiler explosions, an increasing distrust of mere self-acting apparatus has manifested itself. In this, as in many other practical operations of business, it is felt that what we most require is, first, the personal control and supervision of careful attendants, and, secondly, where practicable, an efficient method of ascertaining the extent of their carefulness, which will be an inducement to them to give proper attention to their work. Impressed with these sentiments, Mr. Mann, the superintending engineer of the City of London Gas Works, who has several steam boilers at work day and night under his care, has devised an arrangement of apparatus, of a very simple character, for checking in the most perfect manner the proceedings of the men in charge of the boilers. It requires no extra attention from them, and adds nothing to their usual work; but is so arranged that every time they test the ordinary water and steam cocks, and every time they neglect them, a record is made of what they have done or left undone. An accurate register of the steam pressure within the boiler is also given by it, so that wherever the apparatus is employed the man in charge of the boiler is under the most complete surveillance of his superior officer. The apparatus has been in use for some months past at the Works above mentioned, and, certainly, with most advantageous results. Of course, it would not prevent wilful or wanton neglect on the part of the attendant; but it affords such an unfailing record of his proceedings that nothing short of that could ever lead to a deficiency of water in the boiler, which is the cause from which ninety-nine out of every hundred explosions spring.

The object of the invention, as we have said, is to modify the arrangement of the ordinary water cock and steam cock in such manner as to keep a constant check upon the person in charge of the boiler or boilers, and to cause at intervals, say of half an hour, a pointer or pencil to trace upon a card, moved by clockwork, the pressure of the steam, and to indicate whether the aforesaid cocks have or have not been examined at such intervals. The inventor employs a circular card, with divisions which answer for the twenty-four hours, and this card is caused by clockwork to perform a complete revolution in that time. From the steam and water cocks of the boiler is led a steam pipe, the mouth of which opens into an expanding cylinder, formed by preference of two parts, and united by a tube of vulcanized rubber. Connected to the upper half of the cylinder, which is free to rise from the lower half, there is a rod, the top of which fits into a notch cut in the underside of a lever, the short arm of which is hinged to a fixed support, while its long arm is connected to an upright fitted at top with a pencil or tracer, and free to rise and fall upon motion being communicated to it through the lever. The steam pipe is furnished with a cock for shutting off communication with the registering apparatus if necessary, and the lower end of the steam pipe, below the water cock, is also furnished with a similar cock. The only outlet for water from the water cock, or steam from the steam cock, opens into the said steam pipe, which, or a portion of which, may, if desired, be formed of glass. The operation is as follows:—The card being fixed and connected through its frame to the clockwork, the steam cock is opened, and steam rushing into the steam pipe and cylinder raises the upper part of the latter, and with it the rod, lever, and tracer, causing the last to describe a radial line from the centre of the card upwards to a height depending upon the pressure. As long as the same pressure is maintained the tracer will remain at the same height, and the card, being caused to move round by the clockwork, the tracer will describe a curved line. Now, supposing half an hour to elapse, the attendant, in testing the cocks, shuts off the steam cock of the boiler and opens the lower cock of the steam pipe, and, consequently, the steam rushes out of the latter, and the tracer falls, marking a downward line towards the centre of the card. He then opens the water cock and blows water through, and, after shutting this, opens the steam cock and blows steam through. Then, on shutting off the lower cock of the steam pipe, the steam rushes up that pipe into the cylinder, and the tracer is caused to make another upward radial line, and so on as before described. Any inequalities in pressure will be indicated by the height or distance the traced lines are carried from the centre. Should the attendant omit to perform these operations, that is, should he omit to test his water by means of the cocks every half hour, the absence of the radial lines from the card will

indicate such inattention. It will be obvious that the card may be arranged for other than half-hour intervals, and that any number of indicating cards from different boilers may be applied to the same clockwork. It will be equally obvious that, instead of the revolving card and the tracing apparatus before described, any other convenient apparatus for registering pressure may be applied in connexion with the above arrangement of gauge cocks. The form in which the patentee at present prefers to arrange the apparatus is represented in the accompanying engravings.

In Fig. 1 is shown the improved arrangement of steam boiler gauge cocks. Fig. 2 is a front view of the registering apparatus, shown detached on an enlarged scale; and Fig. 3 is a side view of the same. Fig. 4 is a longitudinal section of one form of the pressure cylinders employed. A is a circular disc, made of paper, card, or other material,

Fig. 1.

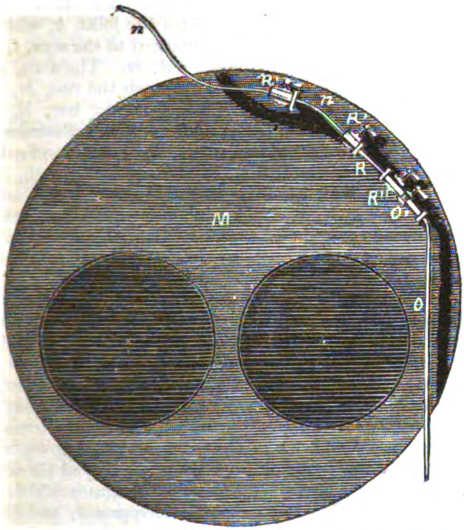
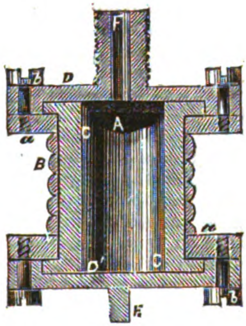


Fig. 4.



with circular lines, *a*, and with radial lines, *b*, drawn thereon; each circular line corresponds to a certain number of pounds pressure, as shown, and the radial lines, *b*, correspond to the twenty-four hours in the day, and are so numbered. The disc, A, is attached to the face of a disc of metal, B, by a thumb screw in the centre. This disc has a boss attached to its back at its centre; a hole is formed in the boss so that it may be mounted on a spindle, caused to make one revolution every twenty-four hours by means of suitable clockwork enclosed in the case, D, and regulated by the pendulum, D'. E is a bar which is capable of being moved in the direction of its length. A boss or socket is formed on the end of the bar, E. A pencil or other marking instrument, F, is inserted in the boss with its point towards and resting on the paper disc, A. A set screw secures the pencil in the socket. The bar, E, passes between two sets of grooved pulleys, G, G, and H, H, and is guided by them so that it may move parallel. The edges of the bar may be angular, to correspond to the grooves in the pulleys, G, G, and H, H. The spindles, *d*, *d'*, of the pulleys turn in bearings in the brackets, I, I, secured to the shelving bracket, J, by screws. The bracket, J, is secured to the framework or standard, K, to which standard the clockwork and case, D, are likewise fixed. The spindles, *d'*, in the pulleys, H, H, are parallel, and have no shoulders or journals formed thereon, so that they are capable of being moved longitudinally in either direction through their bearings in the brackets, I, I. L, L, are slight springs fixed to the front of the brackets, I, I; the ends of these springs exert a pressure on the conical points of the spindles, *d'*, which project a little through the brackets, I, I. This pressure on the ends of the spindles of the pulleys, H, H, causes the bar to press the pencil or other marking instrument against the disc, A, so that when the disc, A, revolves, the pencil will make a simple curved mark

thereon if the bar, E, and pencil, F, remain stationary at zero; but as the bar, E, is attached by a cord or chain, *e'*, to a grooved quadrant, *f*, which causes it, with the pencil, F, to move to and from the centre of the disc, A, a compound line is described by the two different motions. These motions are the angular or rotatory motion of the disc, A, and the parallel or radial motion of the bar, E, and pencil, F. Motion may be given to the disc through clockwork, being acted on by a spring or weight in the ordinary manner, while the bar, E, and pencil, F, receive their motion from a piston or indiarubber disc, placed or mounted in a cylinder in which steam from the steam boiler is allowed to play and exert its pressure. N is the steam cylinder, which is secured by its flanges to flanges of a casting which has a hollow neck formed on it, which is passed through a hole in the plate, O, and there secured by a nut and washer. The plate, O, is supported on and fixed to columns, P, P, by nuts and screws. The lower ends of the columns are supported by and firmly secured to the shelving plate of the bracket, J. The piston rod, *j*, passes through the end of the cylinder cover or bottom, and has an arm, *j'*, fixed on it. The other end of the arm, *j'*, has a slot formed in it for the reception of the joint pin of the joint, *k*, which is passed through it. To the joint, *k*, a rod, *k'*, is attached, and connected to the arm, *l*, of a segmental rack, *j'*, by a joint which is secured to it by a thumb nut, *m*. The arm, *l*, is slotted similarly to that of the arm, *j'*. These slots afford means by which the rod, *k'*, may be readily adjusted in relation to the extent of the necessary travel of the bar, E, and pencil, F, so that it may correspond to the pressure in the cylinder and the distance between the circular lines on the disc, A, which represent this pressure. Q, Q, are standards or brackets which support a rocking shaft on which the arm, *l*, of the segmental rack, *l'*, is mounted. The rack, *l'*, gears into a pinion, *m'*, which is fixed on the same rocking shaft as that on which the grooved quadrant, *f*, is mounted. The rack, pinion and quadrant, or their equivalents, are necessary to give a sufficient amount of travel to the bar and pencil or marker, if there is not sufficient in the piston rod to cause the bar and pencil to traverse from zero to the greatest amount of pressure which is required to be indicated. R, is a tube of glass or other material mounted between the steam cock, R', and water cock, R'', which are fixed to and in communication with the boiler, the proper water line of course being between the two cocks. To the opposite ends of the sockets in which the ends of the glass or other tube are inserted, pipes, *n*, *o*, are attached, having cocks, *n'*, *o'*, mounted on them. The end of the pipe, *o*, is for carrying off the steam or water when the gauge cocks, R', and R'', are being tested. The pipe, *n*, is for supplying steam from the boiler, M, to the cylinder, N, of the pressure gauge and registering apparatus, which may be fixed in any secure place apart from the boiler and out of the reach of the stokers, so as to prevent tampering with it, and likewise to preserve it from being destroyed should at any time an explosion of the boiler take place, and thus preserve a diagram which will indicate the state of the pressure in the boiler when such explosion happened, and also if the person or persons in attendance had been doing their duty. To put the apparatus in operation, after a card or disc, A, has been placed and fixed in proper position, that is, with the point of the pencil or marker resting on the radial line or place which corresponds with the hour or time of the day or night, as the case may be, the pencil at this time standing to the lowest circular or zero line, the clock is set going, and the cock, *n'*, on the pipe, *n*, which leads from the boiler, M, to the cylinder, is opened, which admits steam to the cylinder, and, by pressing on the piston or disc, moves the bar, E, and pencil, F, by means of the before-mentioned apparatus, through a space corresponding to the pressure in the boiler, at the same time the pencil has described a radial line, as at P', from the zero point to the present pressure point. If the apparatus is allowed to go on undisturbed for an hour, or for any space of time, the pencil will draw a curved line, *q*, nearer to or farther from the zero circular line, according to the amount of pressure in the boiler and cylinder; when it is required to test the gauge cocks, R' and R'', supposing them to be shut, first shut the cock, *n'*, and open *o'*. When this takes place the steam escapes from the pressure cylinder, when the pencil makes a radial line to zero, and the gauge cocks tested in the usual way. The gauge cocks are again shut, and the cock, *o'*, is shut, and the cock, *n'*, opened, so as to admit steam to the pipe, *n*, and steam cylinder, when the bar, E, and pencil, F, will be moved outward from zero to the point which indicates the pressure in the boiler. It will be seen that the curved line, *q*, marked on the disc, A, by the pencil F, will represent the pressure in the boiler (whether it vary or not) at any time in the day or night, and that the straight or radial lines marked with the pencil will show the number of times and at what time the gauge cocks were tested, and so keep up a complete register of the state of pressure in the boiler, and of the number of times the gauge cocks have been tested. If it is not desirable to keep up a complete register, but only from day to

day, a piece of ground glass or transparent slate or other material may be made use of to trace diagrams on instead of the paper disc, A. After a diagram has been described on the ground glass or slate, and examined, it may be wiped off, and so any number may be made on the same piece of glass or slate. This ground glass or transparent slate may be placed or fixed in a suitable frame, and mounted on the spindle of the clockwork, similarly to that on which the disc, A, is mounted. The radial and curved lines which indicate the time and pressure may be permanently painted on the back of the ground glass or transparent slate, or one of the prepared paper discs, A, may be placed behind it or pasted thereon. Fig. 4 shows a section of an expanding cylinder, A, composed of indiarubber, and bound with metal hoops or rings, B, B. C, C, are flanges formed on its ends, and clipped between rings, *a*, *a*, and plates or flanges D, D′, where they are firmly secured by the screws *b*, *b*. E, is a piece cast or otherwise formed on the flange D′, to which an arm may be attached for the purpose of moving the bar and pencil, as formerly described. F, is the inlet through which steam is supplied to the cylinder from the boiler. When steam is admitted, its pressure on the ends D, and D′, causes the cylinder to expand in the direction of its length, as the side pressure is neutralized by the rings B, B, and thereby moves through its connections the bar, E, and pencil, F.

ON THE RELATIVE EVAPORATING POWER OF BRASS AND IRON TUBES.

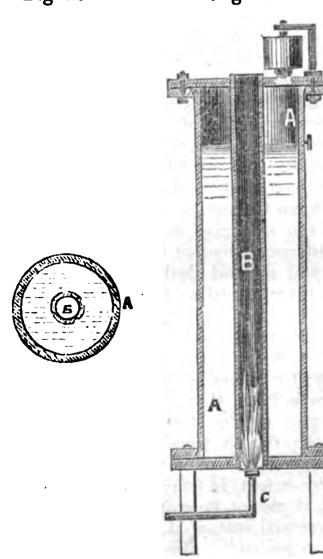
By W. G. Tosh, of Maryport.*

Brass and Iron Tubes for locomotion, marine, and other boilers, having been so extensively employed, their respective properties and defects are generally known under the various trying circumstances and situations in which they have been used; but as there is still a difference of opinion existing on the subject of their relative advantages, the following experiments were made by the writer with great care, for the purpose of arriving at the truth, if possible, and for his guidance, as to the relative evaporating power of brass and iron tubes.

Two vertical boilers A, Figs. 1 and 2, were therefore constructed of equal dimensions, 6 ins. diameter and 2 feet long, with a single tube B in the centre of each, 2 ins. external diameter and No. 14 wire gauge thickness, of brass and iron respectively. The two boilers were filled with water of the same quality and of the same temperature, and alternately placed upon a stand in the same position over a gas flame C; they were each exposed to the action of the gas for the same length of time, which was equivalent to the same quantity of fuel being consumed in each case; and the height of water was carefully gauged after each experiment as soon as ebullition had ceased. The experiments were first made during the day, and afterwards at night, at times when there was the least probability of a change of pressure in the gas pipes during the period of the experiment, by lighting or extinguishing the gas in the town.

The Table at p. 54, shows the results of eight experiments made with the above apparatus, the quantity of water evaporated being measured by the number of inches that the level of the water in the boiler is lowered in each experiment: the average shows that 2 lbs., cwts., or tons of fuel with brass tubes evaporate the same quantity of water as 2½ lb., cwts., or tons of

Fig. 1. Fig. 2.



the same fuel with iron tubes; hence the evaporating power of brass is to that of iron as 125 : 100, or brass will evaporate about 25 per cent. more water than iron with the same quantity of fuel.

* Read at the Manchester Meeting of the Institution of Mechanical Engineers.

Table of Experiments on the Relative Evaporating Power of Brass and Iron Tubes.

Description of Tubes.	Quantity of Water Evaporated.								
	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.	Average.
	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
Brass	2	$\frac{3}{4}$	$2\frac{1}{2}$	$2\frac{1}{8}$	3	$3\frac{1}{4}$	$3\frac{1}{4}$	3	$2\frac{1}{3}$
Iron	$1\frac{5}{8}$	$\frac{3}{8}$	2	$1\frac{1}{2}$	$2\frac{5}{8}$	$2\frac{3}{4}$	$2\frac{3}{4}$	$2\frac{1}{4}$	2

Further experiments were made with brass and copper tubes, and copper was found to be fully as much superior to brass as brass is to iron; so that the evaporating power of copper is to that of iron as 156 : 100, or copper will evaporate about 56 per cent. more water than iron with the same quantity of fuel.*

LIGHT QUESTIONS.

(From the "*Statesman*.")

THE subject of gas has recently been one of the most interesting topics of discussion in many of the metropolitan districts, and is likely to continue so, unless the gas consumers make up their minds to submit quietly to the demands of the gas manufacturers. According to one statement we have heard, the Marylebone quarter is one in which the evils of monopoly are likely to be felt most severely. The two rival Companies in that borough have come to a mutual understanding, and the result has been the very opposite of what happens to the honest portion of the community when a certain class of men fall out. The price of gas to the consumer has been raised some 30 or 40 per cent., and that too at a time when tradesmen are suffering severely from the slackness of trade. Of course this advance of price causes much grumbling, and a good deal of controversy has taken place regarding the various modes of lighting streets and houses, with a view to ascertain what improvements might be made in economy and efficiency.

A writer in the *Mechanics' Magazine* expresses a hope that the Allied Gas Company will employ the extra profits it is likely to derive from high prices in improved methods of purification. "While sulphur exists in such proportions as is usual, it cannot be employed in dwellings, however well ventilated, without great detriment to health." This defect, according to the *Mechanics' Magazine*, for the present leaves the household table to the care of the lamp-makers, of whose productions he mentions several, and, among others, those of the Paraffin Light Company, 29, Oxford-street, which, he says, "will be on many a table this winter." Leaving the lamp question to the *Mechanics' Magazine*, we have a few words to say on the material consumed in the lamps manufactured by the above Company.

Some eight or ten years ago a spring of mineral oil was discovered on the estate of Mr. Oakes, near Alfreton, Derbyshire, which was purchased by Mr. James Young, of Manchester, and introduced extensively in the mills and factories of Lancashire as a superior article for the lubrication of machinery. Just when he had succeeded in creating a pretty brisk demand for the article, the supply suddenly ceased, the spring having dried up. Mr. Young, who is well known as one of the first practical chemists of the day, thought he would try to imitate nature, and, after many experiments, he succeeded in producing a mineral oil precisely alike in quality to that which had been obtained from the Derbyshire spring, and, in doing so, "made one of the greatest discoveries of the age."

Baron Liebig, in his "Familiar Letters on Chemistry," after some remarks on the cost of gas in England and Germany, says:—"It would certainly be esteemed one of the greatest discoveries of the age if any one could succeed in condensing coal gas into a white, dry, solid, odourless substance, portable, and capable of being placed upon a candlestick, or burned in a lamp." This was said by the German Professor

* The above paper was subjected to a very searching discussion, strong doubts being expressed as to the accuracy of the results of the author, who promised to extend his experiments on a large scale, and communicate further with the Institution upon the subject.—EDS. M.M.

in 1841. Ten years later, the Report of the Jury on Chemical Products at the Exhibition in 1851, after referring to the desideratum which the sagacity of Liebig had pointed out, characterized Mr. Young's invention as a realization of the thing required. "This very problem," said the Report, "appears to have been accomplished by distilling coal at a low temperature, whereby he obtains, instead of gas, a liquid substance capable of being burned in lamps like sperm oil." If we add to this testimony of the London Jury, composed of the first authorities in science, the well-ascertained fact, that one gallon of patent Paraffin oil, which costs only 3*s.* 8*d.*, gives as much light as 22 pounds of the best sperm candles, and that it differs entirely from camphine and various other oils in being unexplosive, we have said enough to show that Mr. Young's invention, which has only recently been introduced in the metropolis, is likely to work a revolution in the lighting of dwelling-houses.

THE LAUNCH OF THE "LEVIATHAN."

Monday, Jan. 11, 1858.

We now resume our summary of the proceedings connected with this launch, commencing with Tuesday, the 5th instant. On this day operations commenced shortly after nine, a.m., R. Stephenson, Esq., M.P., and several other scientific gentlemen being present. The principal object at this time was to square the ship. To accomplish this, the after presses were kept full on, and the foremost ones eased, the chains not being used at all. By five, p.m., the distance travelled was 3 feet 1½ inches at the fore cradle, and 7 feet 8¼ inches aft; no mishap having occurred. On Wednesday the distance travelled was 9 feet 9 inches forward and 10 feet 2 inches aft, nothing having occurred to call forth any particular remark. On Thursday, the distance traversed was 10 feet 10 inches forward, and 11 feet 3 inches aft. On this day, when getting a strain upon the after engine chain (the one that was sunk on Monday), the mooring chain to which the standing part was shackled broke; but as the stern had a tendency to run off with a great deal less pressure than the bow, this did not interfere with the proceedings. On Friday morning, it being found that the stern was still going rather faster than the bow, a little extra strain was put upon the foremost chains, when the engine barge suddenly came home. Upon going over it was found that the cross piece, by which Trotman's five-ton anchor was backed, had broken, and the anchor had come home seven or eight feet, proving that the anchor did not hold very well. The other chain (the one attached to the seven-ton anchor) was also broken; and about the same time two of the crabs were broken. By the exertions of Captain Harrison and Mr. Roberts these damages were quickly repaired, and the distance traversed when the work of the day was suspended was 11 feet at the fore cradle and 12 feet 8 inches at the aft. On Saturday, the distance travelled was 14 feet 5 inches forward and 11 feet 9 inches aft; the only thing worth special notice being the fact that the shock, or reaction of the ship, after each start, was much less than it had been; and that the stern started with from 17 to 20 per cent. less pressure than the bow. This day operations commenced at eight o'clock, and the ship started almost immediately, with less than 20 cwt. to the inch pressure, and has since gone 21 feet 7 inches forward and 21 feet 3 inches aft; the stern still requiring less pressure than the bow by from 3 to 5 cwt. to the inch. The only mishaps of the day have been the getting out of order of a pump, and the crushing up of one of the pieces of wood which transmit the hydraulic pressure.

Thursday.

On Tuesday last operations commenced about half-past seven, a.m. The ship yielded immediately with about the same pressure as on Monday. As the tide rose the hauling chains were slacked to ascertain what pressure was necessary to start her without them; also, to ascertain what effect the tide would have upon her. These experiments were continued until high water, with satisfactory results. The hauling power was then again put on, and kept up until two o'clock, when, the ship having gone 15 feet 2 inches forward and 16 feet 10 inches aft, and being now quite square on the ways, the men were knocked off for the day. There was 8 feet of water under her. At about half-past eleven yesterday (Wednesday), part of the presses being disconnected, the pumps were set to work and the vessel started directly. The pressure having been ascertained, further operations were suspended until this day at high water. It is not, however, intended to attempt to float her until the next spring tides (at the end of this month), it being deemed questionable if there will be water enough during the present tides. Besides this, the poppets have to be taken out, which will involve a work of some days.

Not having the necessary data, it is im-

possible for us to foretell whether any contingencies not provided for by Mr. Brunel may even yet occur to postpone the floating of the ship beyond the end of the present month. It appears to us, however, not at all improbable that the ship will be found to need more water to float her than she is expected to require. The weight of the ship and what she contains, and therefore the light displacement, has probably been obtained accurately enough; but the inclination of the line of flotation is not so easily determined. Mr. Brunel professes to have contrived a simple method of fixing it, but we very much doubt its efficacy. It is satisfactory, however, to know that if she should be found to hang at the stern, a little extra buoyancy may be easily applied to relieve her. The shareholders may safely, we think, cheer themselves by believing that Mr. Brunel will succeed in launching her within the *three months!*

The Elements of Descriptive Geometry: being the First Part of a Treatise on Descriptive Geometry, and its Application to Ship-building. Adapted for the Use of Students in the Universities and Civil Engineers. By JOSEPH WOOLLEY, M.A., LL.D., late Fellow of St. John's College, Cambridge. Published by Direction of the Lords Commissioners of the Admiralty. London: John W. Parker, West Strand.

Plates to Dr. Woolley's Descriptive Geometry. London: J. W. Parker.

An Elementary Treatise on Orthographic Projection: being a New Method of Teaching the Science of Mechanical and Engineering Drawing, intended for the Instruction of Engineers, Architects, Builders, Smiths, Masons, and Bricklayers, and for the Use of Schools. With numerous Illustrations on Wood and Steel. By WILLIAM BINNS, Assoc. Inst. C. E.; Master of the Mechanical Drawing Class at the Department of Science and Art, and at the Government School of Mines. London: E. and F. N. Spon, Bucklersbury.

THE uneducated mind, in noticing any object, deals with the external, the visible only. It is the pride of Science that she empowers the mind to look beyond these—to penetrate within that which the eye sees, and to comprehend the internal, the concealed. By her aid we pass through the solid substance of the earth like unbodied spirits, beholding as we go what is hidden there; by her aid we are becoming as much acquainted with the heavens as if we could step from planet to planet and walk from star to star. And, in lower matters, the same power is conferred by scientific studies. Let two men stand by the side of the "Leviathan," for example,—one a shopkeeper, and the other a cultivated ship-builder. The first sees the mass of metal tower before him, and acquires some vague idea of its form and proportions, and perchance catches also a dim sense of what she must be like inside. But the other, with his cunning mental power, sharpened by years of special study and experience, cleaves the vast hull into sections and plans, in this direction or that, as he pleases, and spreads the monster out, piecemeal, before him—every part pictured as clearly to his eye as the outline to the eye of the shopkeeper. It is the same with machinery. The amateur eye, looking upon a steam-engine, stops short at its surface and contour, while the educated eye sees within it—sees it, that is, in *section*, as well as in elevation, or plan, or perspective.

Now, the power of acquiring this *thorough* perception of ships, machines, buildings, &c., so as to enable him to represent any required section of any given object, may be obtained by the student, and the object of the two works above mentioned is to facilitate its obtainment. They stand in nearly the same relation to each other as Theoretical (Plane and Solid) Geometry and Practical Geometry relatively occupy. A person who has studied the books of Euclid never thinks of learning "Practical Geometry," because there is but little in it which he does not already know. For Practical Geometry is very little more than a portion of Theoretical Geometry *without the reasoning*. Therefore, if a man wishes to teach his son geometry at all, it is Plane and Solid Geometry (Euclid's Elements) to which he resorts; and none but workmen hard up for time ever think of bestowing

much attention upon the other. We do not intend to imply that Mr. Binns' book is without reasoning, or that it has nothing in it of practical value beyond what is given in the theoretical treatise of Dr. Woolley: the analogy does not extend thus far; but no one who has ever studied the latter work will require to do more than glance through the former.

Dr. Woolley's "Descriptive Geometry," with its accompanying volume of elaborate plates, has been published some few years, and is by far the most valuable book upon the subject in the English language. It was published by the direction of the Admiralty, primarily for the use of the late Central School of Mathematics and Naval Construction at Portsmouth, and was to have been followed by a second part, giving the application of this beautiful branch of geometry to the laying-off and building of ships. The changes made by the Admiralty have led apparently to the abandonment of this intention, which is much to be regretted. The volume before us is, however, complete in itself, and amply sufficient to smooth the way to the whole art of laying-off and ship construction, as well as to every other practical art in which it is required "*to determine, by constructions made on one plane only, the form of any figure whatever,*"—which is the object of Descriptive Geometry. The authorship of Dr. Woolley is so strong an assurance that the work is well and soundly written, that we need say nothing on this point; yet we cannot forbear offering our testimony to its clearness and accuracy, which save the student from all doubt and embarrassment. We most warmly recommend the study of it to every young man who is touched with the honourable ambition of distinguishing himself in civil engineering, or in civil or naval architecture.

Mr. Binns designates his treatise "A New Method of Teaching the Science of Mechanical and Engineering Drawing," and in his preface attempts to justify this on the ground that hitherto drawing from "a copy" only has been taught. In this, however, he is greatly mistaken. Every day the teaching of drawing from models, machines, &c., goes forward under our own eye, as in many other places. Still, there is not the shadow of a doubt in our mind respecting the necessity of a vastly-extended system of instruction in either Descriptive Geometry, or "Orthographic Projection," as Mr. Binns designates the practical part of the subject. It is equally certain that his book will offer an invaluable aid to such instruction. He has brought a large amount of experience to bear upon its preparation, and has written it with clear and ample knowledge of the wants which the learner most feels, and of the difficulties by which he is most likely to be beset. Wherever the study of the more theoretical and sufficient work is not practicable, we strongly recommend Mr. Binns' book.

Having thus glanced at the comparative and respective merits of the two books, we must, before concluding, point out a highly important fact connected with the study of Descriptive Geometry, as it is treated in Dr. Woolley's work. Our readers do not need to be told that some studies have a value independent of their immediate objects. For example, the study of Euclid is pursued all the world over, not merely for the sake of the geometrical knowledge thereby acquired, but also because it is found to cultivate the reasoning faculties, and to spread a love of, and an aptitude for, logical processes, which are of great importance to men of every calling and rank of life. Now, what Euclid's Elements thus do for the reasoning faculties, Descriptive Geometry does for the *mechanical faculties.* It makes the mind expert in judging of, and dealing with, *solid bodies*, to which all mechanical pursuits are directly related. On this account, therefore,—which is, indeed, a more important consideration than any before mentioned,—we urge the study of Descriptive Geometry upon our young readers, and upon all who have sons to train up for the profession of any branch of practical science.

The Revolver: its Description, Management, and Use; with Hints on Rifle Clubs and the Defence of the Country. By P. E. Dove. Edinburgh: A. and C. Black. 1857.

This book is not without merit, but its title is far too broad for its character. Indeed, it looks very much like a puff of Mr. Robert Adams's weapon. It is certain, at least, that, though entitled "*The* Revolver, *its* Description, &c.," the only revolver described in it is the one just mentioned. It is just to add, however, that the writer avowedly considers that the best.

Mr. P. E. Dove is stated here to be the author of the article "Gun-making," in the latest edition of the *Encyclopædia Britannica*, and consequently is not without claim to notice. For this reason, and on account of its actual value, we give an outline of the book. The author first tells us that in 1857 he visited London, and examined the factory of the London Armoury Company, and the Government Rifle Works at En-

field. In reference to the latter, he says, "Whatever may be said by the defenders of the old system of fitting the various pieces of a rifled musket *by hand*, it is unquestionable that the muskets now made at Enfield are turned out in a manner with which no human hand, under any amount of skill or practice, could possibly compete. The work is so accurate and so sound that there can be no hesitation in pronouncing the Enfield rifle to be the best weapon that ever was placed in the hand of the infantry soldier. I do not like its bullet, nor do I believe that any cupped bullet has ever been made to shoot as well as a solid bullet. But even on this point there is latitude for a difference of opinion, because the Enfield bullet being intended for military purposes alone must combine the military requirements of great power and easy loading; and therefore an objection 'that some of the bullets go astray' must be judged by the military standard and not by the standard of the sportsman or the target-shooter. But as regards the musket, there can scarcely be a difference of opinion. It is marvellously good."

The recent mutinies in India have brought to light the true value of revolvers, by showing the terrible power they impart to their possessors. Mr. Dove laments that this power was not more generally possessed by our officers and men, and also that the rifle had been placed in the hands of the native Bengal troops. "A flint musket," he says, "is quite good enough for them to do the work of tax-gatherers and policemen. As to genuine fighting, in the first place they had nobody to fight with, and on the frontiers, where fighting might be expected, the real work must always fall upon the British troops in the long run. It was therefore an error of the most serious kind to give these cockatoo Brahmins of Bengal the Enfield rifle, and the sooner the error is repaired the better. But what is the next best thing to do? evidently to send out to India a large supply of this new weapon—the revolver—that all India may know that a new weapon, not attainable by the natives, have arrived by thousands—a weapon which can shoot five men in five seconds, and which can be carried in the pocket, the belt, or the holster by pairs. Let India know that fact, and let all Europeans in India make a point of procuring revolvers and exhibiting them as need may be, and we should soon see the impression in the fears of the population. If Colt's pistol has had the effect of putting down the Indian wars and Indian incursions in the frontier states of the Union, surely it could not be unreasonable to anticipate that a similar effect would be produced in India, and that the presence of the revolver universally in the hands of the Europeans would tend immensely to the security of British rule. . . . . It may look at present only a mere suggestion; but if the news comes home from India that hundreds of lives could have been saved *by revolvers*—as most certainly must have been the case whether the announcement may or may not be put in those words—then we may expect whole rivers of criticism, splendidly written, but *too late*. In this crisis, therefore, none need hesitate to bring before the attention of the Government and of the country the imperative necessity of sending revolvers to India; of arming the cavalry and the engineers with them, the artillery under certain circumstances, and even a certain number of men in each regiment of European foot. Sooner or later our men *must* come to close quarters with the Sepoys, and the revolver is the very best of all fire-arms for close work."

After glancing at the history of the *rifle*, Mr. Dove approaches the *revolver* in no dove-like spirit. The two, he says, should go together—the rifle for the long range and the bayonet rush—the revolver for the assault, the *melée*, and the surprise. And above all, the cavalry soldier ought to have it. He is put on a horse to give him quickness of action, and he is encumbered with a barbarous carbine which impedes all his movements and which he very properly cuts away whenever he has serious work to perform with the sword. Now instead of this carbine, why not give him a revolver, which he can use with one hand, or even two revolvers, one in each holster? and then, whenever he charges he carries with him the best weapon for the skirmish or the close fight.

The author next describes Mr. Adams's revolver, sets forth his view of its advantages, and gives instructions for its management. He then gives a chapter upon rifle clubs and national defence, recommending a general use of the rifle and revolver throughout the country. As an incentive to this he says, with a smartness and an exaggeration which characterise his style, "There are two countries that are almost invincible for defence—the United States of America and the Republic of Switzerland. If an army of a million of men were landed at New York they would make no very serious impression on the American nation. They would be shot off at a calculable rate per diem, and a tolerable guess might be made (and the Yankees would bet largely on the event) as to how long they would last. And wherefore? Because *rifle-shoot-*

ing is the great national sport; and because the revolver would help the rifle. It is the same in Switzerland. The Prussians knew better than to go into Switzerland. Puff! puff! the blue smoke would have been puffing everywhere, and all day, from behind every rock and river; and every visible Prussian would have been puffed off with a rifle plug in his brisket. A nation that takes thoroughly to the rifle is impregnable."

The author concludes his little volume by a severe and not undeserved attack upon the practice which has led to the depopulation of the Highlands of Scotland, from which a noble race of men might have been drawn to meet the exigencies of war. "Time will show," he says, "whether Britain may ever again require to stand on her defence; but certain it is that the best, the cheapest, and the most profitable way to grow an army, would be to grow it in the Highlands of Scotland, even if the depopulated lands were hired on purpose."

On the whole the book is well calculated to make known the great importance of the revolver as a weapon of defence, and to suggest considerations which will produce a wholesome effect on the minds of many.

Mechanical Inventions and Suggestions on Land and Water Locomotion, Tooth Machinery, and Various other Branches of Theoretical and Practical Mechanics. Second Edition, including Appendix. By Lewis Gompertz, Esq. London: W. Horsell, 492, New Oxford-street.

We have had this book in our hands for some time; but, as it bears no date, we might have kept our delay secret had we chosen. We have had occasions, however, for our silence respecting it, and these are, first, the difficulty of dealing justly with such an odd mixture of what *may be* useful, and what certainly *is* worthless; and, secondly, the patched and imperfect manner in which the book is got up,—portions of it being pasted in, and portions even written in pencil. When an author thinks it necessary thus to mutilate and mend his own printed book, it is not improbable that a just critic will find it of very questionable value. There is also another difficulty experienced in noticing this book: it is, in great measure, an undated reprint from the pages of this and other magazines; and we find it difficult, therefore, in determining whether the suggestions and improvements which are really valuable in it were or were not originated by the author. It is certain, however, from his manner, that he has written throughout with perfect honour and good faith.

But with all its defects, this book will be found very useful and very entertaining by any reader of an ingenious mechanical turn of mind. It undoubtedly contains many valuable hints, and some complete inventions of importance. For example, on page 40, we observe a proposal for an inclined railway, containing the essential feature of the "grooved surface frictional gearing," which has been lately introduced by M. Minotto, of Piedmont, and patented by Mr. Robertson, of Ardrossan.*

Mr. Gompertz concludes his book by "warning" his fellow-labourers on the "Patent Law." He thinks men often waste money upon patents, as they unquestionably do. But then multitudes of patentees do not, but, on the contrary, reap richer rewards by means of them than they could acquire by any other means whatsoever. We know at the present moment several persons who, by combining a little business tact with good inventive powers, are building up pretty considerable fortunes. The truth is, inventions must be *worked* as well as patented, and for this either tact or capital is indispensable. A man who can invent, but is without capital to work his invention, and without skill to get it worked for him, has no better grounds of complaint against the Patent Law, than he who can write a book, but can neither publish it, nor get it published, has against the Law of Copyright. And as to patentees being liable to have their rights infringed: every decision obtained in the law courts for some time past, almost without exception, has shown that both judges and juries are firmly determined to support those rights.

A Handy Book on Property Law. In a Series of Letters. By Lord St. Leonard's. William Blackwood and Sons, Edinburgh and London. 1858.

A plain man of business who is so fortunate (or, as it often proves now-a-days, so unfortunate) as to possess property of some value, cannot think of those experienced lawyers who have been all their lifetime acquiring that kind of knowledge of which *he* is utterly deficient, but which he sometimes greatly needs, without a certain sense of envy; or without, at least, wishing they would condescend to set that knowledge forth in simple, every-day language, and in

* See *Mechanics' Magazine*, vol. 61, p. 395; and Vol. 64, p. 511.

a cheap, accessible form. This is precisely what Lord St. Leonard's—one of the very first of the learned gentlemen we have referred to—has done in the book before us. We need not, surely, say anything additional in its favour. Henceforth Property Law is a matter wherein the way-faring man, though a fool, need not err. It may be well, however, to state that, among the *properties* treated of therein, our readers will find many of especial interest to them, such as "Fire Insurance—Timber, Fixtures — Nuisance — Buildings, Drains, Fences, Supports, Lights, Working of Mines—Water," &c., &c. Its low price—half-a-crown—puts it within the reach of all.

ON STRETCHING CABLES AND RIGGING.

BY GENERAL T. PERRONET THOMPSON, M.P.

To the Editors of the Mechanics' Magazine.

Gentlemen,—In the course of some experiments with musical strings the fact forced itself into notice that a new string of catgut, if loaded with weights, breaks at a much lower musical pitch than strings of the same kind stretched gradually by something of the nature of a windlass, as is the case in musical instruments in general; implying tnat it breaks with much less strain. And strings which have been previously stretched in the latter way, will bear straining to nearly the same pitch by weights.

The reason clearly is, that, in the windlass fashion, every yielding of the fibres is attended with a relaxation of the whole tension, and so there is time for something like an equal distribution of the pressure. But when the strain is produced by a weight it is relentless and incessant, and any fibre which is unfairly treated in the twisting is ruptured before any equalization can be effected, and so the fibres are broken in succession.

This accounts for the fact noted by seamen, that a cable which has never been in the water before, sometimes will part when an old one will hold; which shows that hempen cables and rigging ought to be stretched with a windlass before leaving the manufactory; and during this operation they should rest on the floor or deck, otherwise the effects will be to some extent the same as of using weights.

On making the same kind of experiments with wires no such difference was found; whence may be inferred that there would be no use in stretching iron cables or rigging, unless (as in some kinds is the case) where they are formed of wires or rods twisted together.

It is not known how far the above is carried into practice; but it is possible there may be quarters into which the knowledge might usefully be extended.

Yours very sincerely,
T. Perronet Thompson.

Eliot Vale, Blackheath, Jan. 13, 1858.

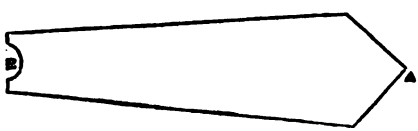
SHIPS' RUDDERS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—You have several very ingenious correspondents who can write cleverly upon a great variety of topics: can either of them explain the *rationale* of the following important fact? I have a theory myself, which I do not venture to ventilate, lest it should fall to pieces.

Of late years ships have been built much longer and sharper than they were formerly, and they sail much faster; partly in consequence of this, and partly in consequence of more active competition.

It has been found that, while sailing at their maximum rate, there has been a violent shaking about the sternpost, which has greatly annoyed passengers, and prevented them from sleeping. There have been a great many instances of this. The following diagram indicates the remedy :—



Let A, B, represent a horizontal section of the rudder; A, the *bearding* or fore part, and B, the *back*. Then a groove cut up and down the back, as shown at B, infallibly relieves the ship of her shaking fit.

The question is, *how is this to be accounted for?* The fact itself is well known and indisputable.

I am, Gentlemen,
Your obedient Servant,
Nauticus.

MONSTER GUNS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Allow me to correct an error in my last communication on the subject of strengthening large guns. A sentence reads thus :—"Therefore the usefulness of the iron is chiefly dependant on the point at which the normal elasticity commences." It should be, at which the *permanent set* commences. Further, it may be

as well to notice a misprint in the insertion of the words "of steam" instead of the words "of strain," in the sentence "sustentation without disturbance."

On quitting this subject perhaps a suggestion, though coming from an *outsider* in the art of gunnery, may not fall amiss. Having learnt from several artillery officers that large pieces of ordnance generally rend in a line coincident with the touch-hole, owing to a local disturbance of the metal's strength at that point by repeated discharges, might it not be worthy of consideration, if practically admissible, to form the touch-hole in the axis of the chamber, which would greatly obviate this disturbance in equality of resistance, facilitate the appliance of external bands, and promote a simultaneous firing of the powder?

Yours obediently,
THOMAS HOWARD.

King and Queen Iron Works, Rotherhithe, 9th Jan., 1858.

CLEARING THE LUNAR DISTANCE.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—In reply to the friendly criticisms of Mr. Merrifield on my proposal in your Magazine of 1st January for a machine for clearing the Lunar Distances, I would observe that the object was to facilitate the determination of the longitude in circumstances where the knowledge was not of instant necessity. Where the question is of avoiding an immediate danger, as is the case at sea, those who wish for the solution must provide themselves with the means for obtaining it upon the spot.

Supposing then (as is the case in all terrestrial positions), the question to be reduced to the means of knowing the longitude six months hence, with the *minimum* of demand on the exertions of the observer, —it was suggested that the subsidiary observations (meaning those additional to the determination of the moon's apparent distance) might be reduced to those necessary for determining the solar time, which are, in fact, no more than are required in any observation for the latitude. "Index error, barometer, and thermometer," must be noted before this last can be done with accuracy. "Refraction, dip, parallax, and finding the time at Greenwich from the corrected distance," are all among the things proposed to be taken off the hands of the observer in Australia and transferred to Greenwich. And what is of more consequence than all these "odds and ends" is, that the great "bugbear," which is the clearing of the distance, is among the things proposed to be transferred. The *formula* given as a sample of calculation instead is certainly not inviting by itself, and is especially ill-adapted to raise an appetite at Sierra Leone or Timbuctoo.

On mechanical difficulties it may be observed, that the power of measuring the third arc *differentially*, goes to do away with the demand for anything that can be called a "shifting pivot." The question is very much one of experiment and trial.

The man must be a ready reckoner, and very hungry to boot, who would undertake to clear lunar distances for 10*l.* the hundred. But the price contemplated after the establishment of a machine, was much less than that. The object being merely to put a check on wanton applications, sixpence might be considered as sufficient charge for one observation, ten for a shilling, and all the observations in the world for half-a-crown. Of course it would be understood they must be observations for the longitude of the same place.

Yours very sincerely,
T. PERRONET THOMPSON.

Eliot Vale, Blackheath, Jan. 9, 1858.

ELONGATED RIFLE SHELL FOR CONVEYING THE LIQUID FIRE.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—This shell differs from my rifle percussion shell only in having three or more holes drilled in its circumference, which holes being plugged with wood plugs, on the shell striking the object, the front projecting plug is forced down on the liquid, when the side plugs are forced out, and the liquid is spread on the canvass or other inflammable matter. I charge the shell by first pouring in the bisulphuret of carbon, and then dropping in small pieces of phosphorus, just sufficient to be dissolved by the liquid. A specimen is to be seen at the South Kensington Museum.

J. NORTON.

Rosherville, Jan. 6, 1858.

AN IMPROVED PEN.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I beg to propose the following instrument for combining pen and inkstand:—

Provide a small cylinder, rather larger perhaps than that of the common pocket pen-holder, into which should fit a smaller and shorter one, terminating at one extremity in a pen, which should have a groove reaching down to the nib, through which

the ink from the cylinder might flow. The longer cylinder should be filled with ink and closed at the top, and an additional case might be placed over the shorter to protect it from pressure, which would be indispensable if used as a pocket instrument. The pressure of the atmosphere would keep the ink in when not in use, and when required the force exercised upon the shorter cylinder, in endeavouring to compress the ink, will of necessity cause it to reach the pen, and thus a constant supply may be had.

I am, gentlemen, yours, &c.,

J. A. D.

MISCELLANEOUS INTELLIGENCE.

Lighting Railway Carriages with Gas.—The experiments upon several of the Irish railways, to test the practicability of lighting railway carriages with gas, have, it would appear, been eminently successful; the invention patented by Mr. Thomas Jefferson Thompson, of Greenwood-park, Newry, providing for and meeting every engineering requirement. We have seldom to announce at the threshold, as it were, of a new system, so complete a success. We understand that Mr. Thompson is about to visit, by invitation, some of the principal lines of railways in this country; and it would be well if the managers of others were to make themselves acquainted with the simple and effective nature of his apparatus, before they try less perfect plans, as the failure of one system very often induces a prejudice against others of undoubted merit, from which prejudice it may take years to recover. Although the *modus operandi* of the Thompson patent would be at once recognised and appreciated by the aid of drawings, it would not be well to attempt to describe it by the pen alone, as some of our contemporaries have fallen into error in so doing. We may, however, find room shortly for the illustrations necessary for the full comprehension of the plan.

Improvements in Making Rope.—Mr. A. F. Sherman, of Roxbury, Massachussetts, at present residing in Liverpool, has patented an invention, the object of which is to obviate the necessity of using a long building, or rope walk, and to obtain the twist in strands and formed ropes to ensure the greatest strength from the material used. The patentee accomplishes this object by mounting the bobbins upon which the hemp is wound upon spindles projecting from rotating tables, mounted upon hollow shafts, and placed one above another when placed horizontally, or one at the back of the other when the faces of the tables are placed vertically. As many bobbins are placed on the spindles of each table as will be required in each layer of yarns, according to the size of the strand or rope to be made. The ends of the yarn he then passes through the holes of a draw plate above the hollow shaft of the table, thence through a tube in the centre of the table, through a hole in the centre of the draw plate of the second table, and through the tube of the second table. The ends of the yarn on the bobbins of the second table he then carries through the holes of the draw plate and tube fitted thereto; and thence conveys them through a like draw plate and tube connected to a third table, which is also supplied with yarn bobbins. The finished strand is drawn from the tube of the last table, and wound upon a reel ready for use. To lay strands into rope he takes as many reels containing the strands as are necessary to form the rope, and places them in the fliers of a solar system machine, or in a stationary machine, and puts in the afterturn or lay with a flier having a reel attached.

Institution of Engineers in Scotland.—The Institution of Engineers in Scotland will meet in the Philosophical Society's Hall, George-street, on Wednesday, the 20th January, at Eight o'Clock, Evening. New Members, Associates, and Graduates will be elected, and the following papers will be read:—"On a Screwing Machine," by Mr. S. M'Cormick; "On the Navigation of Canals by Screw-Steamers," by Mr. Neil Robson; "On a Joint-Chair for Railways," by Mr. Wm. Johnstone; "On Pointing Firearms," by Mr. J. G. Lawrie. The Council will meet at Seven o'Clock. Copies of the President's opening address can be obtained from the Secretary to give to persons desirous of learning the nature and objects of the Institution with the view of joining it.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Underwood, J. ***An improved method of printing, and of preparing materials employed therein.*** Dated Apr. 20, 1857. (No. 1112.)

The object here is to facilitate the production of copies, and consists in preparing the ink and also the paper or other material upon which the copy is to be made, so that when the latter, moistened, is brought in contact with the former, a chemical

action shall take place, by means of which copies shall be produced. (For fuller description, see *Mechanics' Magazine*, vol. 67, p. 604.

NEWTON, W. E. *Certain improvements in meters for measuring the flow of gas, water, or other fluids.* (A communication.) Dated Apr. 20, 1857. (No. 1114.)

This relates to "flexible diaphragm meters," and consists in transmitting motion in a peculiar manner from the flexible diaphragm to the valve or valves by which the direction of the flow is changed to fill and discharge the measuring chambers, and to the registering apparatus, whereby packed working-joints are dispensed with, and the movement is made easy.

CRIGHTON, W., and P. FOXCROFT. *Improvements in machinery or apparatus for preparing cotton, wool, or other fibrous substances to be spun.* Dated Apr. 21, 1857. (No. 1118.)

The patentees apply to the ordinary lap machine an open table or feeding frame, under which they place cans containing the slivers, which are guided to the calender rollers by pulleys, forks, or shafts, upon the open table. The guide pulleys, shafts, or forks may be used separately or conjointly.

SHERMAN, A. F. *Improvements in machinery for the manufacture of ropes, strands for ropes, and for other purposes.* Dated Apr. 21, 1857. (No. 1119.)

This invention is described at p. 62 of this Number.

CHANTER, J., and D. ANNAN. *Improvements in furnaces when moveable fire-bars are used.* Dated Apr. 21, 1857. (No. 1123.)

The moveable bars are made comparatively thin, and two together, with a space between, for the passage of air. The bars are connected in pairs at intervals, and their upper edges made undulating, that the clinkers and cinder may be broken.

SHARPLES, J. *Improvements in drying cotton and other fibrous substances or materials.* Dated Apr. 22, 1857. (No. 1126.)

This consists in subjecting damp fibrous substances to the direct action of steam, for drying them.

BURTON, T., and S. LORD. *An improved self-acting steam-pipe regulator, which is also applicable to drying cylinders, and other similar purposes.* Dated Apr. 22, 1857. (No. 1128.)

For carrying off air and condensed steam from steam-pipes or vessels, without loss, the patentees use a chest, and connect it to the said pipe or vessel. At the upper part of the chest is a small ball valve, which opens inwards, so that when the apparatus is in operation the air may be forced out of the chest. At the lower part of the chest they place a delivery-pipe communicating with the interior of a barrel valve, the passage being open at both ends, and also having an aperture which can open to or close from the outlet-pipe by turning on its seat. Within the chest there is a float connected to an arm supported on a pivot in a bracket attached to one of the sides of the chest. Connected to the barrel is another arm or lever, attached by a connecting rod to the arm to which the float is attached, so that as the float rises or falls motion is given to the barrel valve, causing the aperture in the barrel to be either closed or opened to the outlet-pipe. When the air is expelled, and the float rises, the top gradually opens, and when the float is raised to its full height by the accumulation of condensed steam, the aperture in the barrel is full open to the outlet-pipe.

JOHNSON, J. H. *Improvements in sewing machines.* (A communication.) Dated Apr. 23, 1857. (No. 1133.)

This relates to sewing machines wherein the stitch is composed of two threads, the one worked by a vibrating needle, the other looped therein underneath the fabric by a peculiar circular or discoidal shuttle or spool case. According to one arrangement, a bracket is fitted on the top of the bed plate, for carrying the vibrating needle arm or lever and an auxiliary lever, the two levers being so connected that when the needle arm descends to enter the needle into the cloth the auxiliary arm rises, and draws the upper thread which is passed through an eye in its extremity. Other parts are, of course, included.

TAYLOR, R., R. WORSWICK, and J. LOVATT. *Improvements in railway chairs, and in the mode of securing the ends of rails therein.* Dated Apr. 22, 1857. (No. 1134.)

According to one arrangement, the patentees prefer using a peculiar form of joint chair, suitable either for the ordinary double or single T-headed rail. This chair has a transverse opening through each jaw, and an internal projecting lip, which serves to hold the ends of the rails steady by bearing against the sides thereof. The rail ends are notched transversely, to correspond to the transverse opening through the chair, and a slightly wedge-shaped key is driven transversely through the chair and the notches in the rail ends, by which means they are held firmly down on to the bed of the chair. The expansion of the rail is allowed for by making the slots rather wider than the key. The invention also includes certain clutches and keys for "suspended" joints.

CAVANNA, G. *Improvements in obtaining motive power.* Dated Apr. 22, 1857. (No. 1135.)

This relates to a hydraulic motor, enclosed in a vessel under water. It acts by pressure exercised by two weights on the surface of the water to be raised, which is enclosed in two vessels, the sides of which are formed by two flexible parts, on which the counter weights act. The counter weights are fixed to the extremities of a beam, which takes an oscillating motion on a fixed axis midway of its length. It is to be a self-moving apparatus!

OSMONT, C. E. *Improvements in penholders.* Dated Apr. 22, 1857. (No. 1137.)

This consists in a method of supplying ink to pens from the stem of the holder. The stem is made hollow, and a piston works up and down in it. Through the centre of the piston a double-threaded screw works, and the end of this screw passes through the top of the stem of the holder, and is made fast beyond to the top thereof. From the bottom of the chamber inside the stem a small tube proceeds, and is curved so as to come in contact with the pen at a point near the top of the nibs or split.

ROBERTSON, W. *Certain improvements in machines for preparing to be spun cotton and other fibrous materials.* Dated Apr. 22, 1857. (No. 1138.)

This relates to scutchers, openers, and carding engines. 1st, In carding engines for stripping the fleece or sliver from the doffer, a series of combs attached to and rotating with a shaft is used, and so formed as to admit of their being easily attached and adjusted to it. Around these combs are a series of lags, so placed that as the combs rotate the lags rotate eccentrically to them. As the rollers and lags revolve, each comb as it approaches the doffer passes through a slot in one of the lags, so as to enter the teeth of the doffer, from which it takes the sliver, and as it recedes it gradually returns within the lag, which retains the sliver on the outside thereof, and the sliver is then drawn forward by the calender rollers in the usual way. 2d. The patentee employs a similar series of combs and lags with the carding engine, for opening and delivering the cotton as it passes through the feeding rollers to the licker in or to the main cylinder. 3d. In openers and scutchers he also employs a like series in place of beaters. 4th. In some openers and scutchers, in place of beaters, a cylinder, partially covered with teeth is substituted. In practice, the cotton frequently adheres to these teeth, clogging them up. To obviate this, he places the teeth in lines, leaving space between each two lines for a series of slots. He also forms the cylinder with a boss projecting from each end to form its bearings. These bosses are made hollow, and admit of a pipe being passed through each. These pipes, when within the cylinder, are bent so as to communicate with and support an air chamber open towards the inner side of the cylinder, with which it comes nearly into contact. A current of air passed through the pipes enters the chamber, and, passing thence through the slots as they successively come over it, acts upon the material retained by the teeth, and blows it therefrom.

DUNNETT, M. *Improvements in embroidering or sewing, and in machinery or apparatus connected therewith.* Dated Apr. 23, 1857. (No. 1143.)

According to one plan comprehended here, the frame upon which the fabric is stretched moves in horizontal or vertical grooves in a second frame, which is capable of moving at right angles to the first frame in grooves upon the fixed framework of the machine. The regulating movement by which the embroidered device is shaped may be constructed on the principle of any suitable pantographic instrument.

SCARR, G. and J. POLLARD. *Certain improvements in power-looms for weaving.* Dated Apr. 23, 1857. (No. 1146.)

This consists in the use of a link and catch, so arranged that they shall cause either a permanent or a broken connexion between the crank arm and the slay of the loom, and by working in conjunction with other parts prevent injury to the thread, if the shuttle does not complete its throw, &c.

GARNETT, J. *Improvements in the construction of corsets.* Dated Apr. 23, 1857. (No. 1148.)

This consists in the application of india-rubber stocking wove fabric to corsets constructed of coutil, jean, &c.

RICHARD, J. *An improved agricultural machine for cleaning grains.* Dated Apr. 23, 1857. (No. 1149.)

The patentee claims the combination of two sets of revolving fans, wire gates, and hollow perforated metallic cylinders, working either simultaneously or separately, for cleaning grain by the motion imparted to the said fans, &c.; and he claims the graduated perforations of the cylinders in both sets of apparatus so as to clear and gather separately each kind of grain.

BODMER, R. *Improvements in safety valves for steam boilers.* (A communication.) Dated Apr. 23, 1857. (No. 1150.)

The safety apparatus is constructed so that when the pressure of the steam rises beyond its fixed standard, steam or water

(the latter in preference) is admitted under or over a piston moveable in a regulating cylinder or barrel, by a pipe which takes up the steam or water at such a distance from the point where the steam escapes through the evaporator, as that no sensible diminution of pressure may take place.

WRIGHT, G. *Improved apparatus for heating.* Dated Apr. 23, 1857. (No. 1151.)

This consists in forming the case of an air stove, or other grate, of corrugated metal. The patentee also constructs gas and other stoves in corrugated sheet iron, and places the jets of gas on or in proximity to deep corrugations which, becoming heated, transmit the heat from the extended surfaces of the corrugations inside, and cause it to radiate from corresponding corrugations on the outside.

BISHOP, A. D. *An improvement in the construction of windlasses.* Dated Apr. 23, 1857. (No. 1152.)

The object here is to reduce the friction of the journals of windlass barrels upon their bearings, and thereby to render of avail (for the drawing in or letting out of heavy chains or ropes) pairs of windlass barrels, mounted in the same frame, and around which the chain or rope is lapped, passing from one barrel to the other in the act of drawing in or slackening off. The friction is reduced by the introduction of anti-friction wheels.

CAMBRIDGE, W. C. *Improvements in chain harrows.* Dated Apr. 23, 1857. (No. 1153.)

The patentee dispenses with the horizontal transverse rigid bars, and in place thereof employs a flexible or jointed bar in lengths, each consisting of several links formed in one piece, and coupled together (broadways of the harrow) by joints which will admit of their bending lengthways, but not of crowding up, as would be the case with the links of an ordinary chain. The implement will thus be kept expanded to its full width, but it will at the same time be allowed to yield laterally to any unevenness in the ground.

ROCHETTE, A. P. *An improvement in currying leather.* Dated Apr. 23, 1857. (No. 1155.)

This consists in applying the greasy matters obtained from shoddy, in place of the tallow or oily matters usually employed by leather curriers.

WAY, J. T. *An improvement in the manufacture of soap.* Dated Apr. 23, 1857. (No. 1156.)

This consists in the application of a nameless rock or clay, which is found in Surrey, and which is known to contain a large quantity of silica soluble in a boiling alkaline solution without pressure, in the production of an alkaline silicate; and also the use thereof in the manufacture of soap.

ROCHETTE, A. P. *Improvements in currying leather.* Dated Apr. 23, 1857. (No. 1157.)

This consists in the application of the greasy and oily matters obtained from the wash waters resulting from washing wool preparatory to the wool being manufactured: also in the application of the oily and greasy matters obtained from waste waters or soap suds resulting from the fulling of woollen and other fabrics. These greasy and oily matters are applied by curriers similarly to the tallow or other oily matters heretofore used.

MANICO, E. *Improvements in obtaining foundations for marine or other structures.* Dated Apr. 24, 1857. (No. 1159.)

The patentee employs a hollow fabric of iron of any shape. The capacity of the caisson is usually a cubic yard, which will contain about one ton of stone, and when bedded in sand or shingle, the interstices between the uneven sided stones will receive from 10 to 12 cwt. of sand or shingle, which will work into the caisson, and form a solid mass, and with the iron of which the caisson is made.

CLARK, W. *Improvements in machinery or apparatus for embroidering.* (A communication.) Dated Apr. 24, 1857. (No. 1160.)

This invention cannot be described without engravings.

CRADDOCK, T. *Certain improvements in the steam-engine and the steam-boiler.* Dated Apr. 24, 1857. (No. 1162.)

This refers to previous patents of the patentee, and has for its object the realization of economy in the use of high-pressure steam expansively, by superheating the steam on its way from the boiler to the first cylinder, and also on its subsequent passage to a second or other cylinders, by causing it to pass through a number of small tubes heated by high-pressure steam.

CADDICK, J., T. HEMMINGS, and D. CADDICK. *Improvements in puddling and balling furnaces for heating and melting iron or steel.* Dated Apr. 24, 1857. (No. 1163.)

The puddling furnaces are each constructed with a door and feed-hole on one side near the bridge to work one heat, and also a door on the contrary side near the stack. There is a sham door on hinges over each working door, to prevent the heat interfering with the man while at work. This furnace admits of the heating of two heats of iron at the same time. The

same passes over one heat of iron after the other. It is also constructed with a preparing chamber underneath the stack to charge the heat for the furnace next to the stack, so that the one heat can be charged when the puddler finishes balling his heat, so as to get that heat sufficiently heated, to be ready to melt with the heat that is charged next to the bridge.

SMITH, M. *Certain improvements in looms for weaving.* Dated Apr. 25, 1857. (No. 1164.)

The patentee claims retaining the shuttles in stationary levers separate from the lay, and making the lay as usual, with the exception of a moveable guide, a top guide rail, and an apparatus for raising the shuttle.

SUNDERLAND, S., and R. DEAN. *Improvements in looms for weaving.* Dated Apr. 25, 1857. (No. 1167.)

This consists of a weft break, which is a segment of a circle of metal, covered with leather. Connected to the segment is a projection, fitting a corresponding space in a frame fitted to a side frame of the loom, and placed so that the segment may act vertically, horizontally, or at any angular position. The end of the projection is not connected to the lever, but presses upon the end near its fulcrum, similar to a steel yard. In either case all parts of the break touch the flywheel at the same time, in consequence of its moving in a slide or groove, and not connected to a lever working upon a pivot or fulcrum.

OTWAY, E. W. *Improved apparatus employed in descending and ascending pits or shafts, and raising minerals and other bodies therefrom.* Dated Apr. 25, 1857. (No. 1168.)

This consists, first, in attaching four spring roller buffers to the carriage or platform upon which the moveable skips or bowks are placed, in order to lessen the concussion of the same against the sides of the shaft. It relates, secondly, to the moveable cover of the pit mouth, and consists of two bolts worked simultaneously by a lever and links, so as to lock the cover when in its place (either on or off), and prevent it from being moved without its being previously unlocked by the lever. Thirdly, a brake pulley is attached to the drum shaft, and connected by a lever and link to a shaft upon which a hand lever is keyed. Fourthly, an apparatus is used for signalling from the bottom to the top of the shaft, and *vice versa.* A bell is placed at the bottom of the pit and another at the mouth. Each of these bells is provided with a hammer acted upon by a lever and a spring.

MANN, T. *Improvements in horse powers.* Dated Apr. 25, 1857. (No. 1170.)

This consists of an upright shaft fitted with a platform at its lower end, upon which the horses walk. This platform is supported by suspension rods connected with a boss on the shaft. The horses are yoked to a bar, which is fixed to a collar revolving loosely round the shaft, so that as the horses walk they cause the platform to rotate in one direction, whilst they push the bar round in a contrary direction. The two motions are transmitted jointly to a shaft by gearing.

SIMPSON, J., and E. RIMMER. *A certain improvement in Venetian blinds.* Dated Apr. 25, 1857. (No. 1171.)

The patentees claim the covering of laths used in the construction of blinds with a metallic composition, foil, or leaf, so as to produce thereupon a reflecting surface.

NEWTON, W. E. *The application of certain substances not hitherto used for food, as a source of nutrition and support to the respiratory organs of animals.* (A communication.) Dated Apr. 25, 1857. (No. 1172.)

This consists in using bituminous coking, spent pitch, and coal of every sort, together with the *humus, asphaltum, lignite,* bitumen, peat, the oxydised portions of petroleum, coal tar, crude coal oil, and also resins of any kind, which are the oxydised residuums of the distillation or evaporation of the volatile hydro-carbons of the turpentine or balsam species, as a constituent source of food, in combination with corn, potatoes, rye, oats, barley, buckwheat, &c.

CORY, W., jun. *An improvement in the manufacture of coke.* Dated Apr. 25, 1857. (No. 1174.)

This consists in combining gas tar or pitch with small coal or slack, such as Merthyr Duffryn, and Groigola, anthracite, Hartley's, hard steam, and others, free from bitumen, which is not in itself capable of coking in the ordinary manner in coke ovens.

BURROW, J. *Improvements in coating wrought iron.* Dated Apr. 25, 1857. (No. 1175.)

The patentee constructs a trough, and arranges down the sides or ends in parallel lines non-metallic projecting pegs, which keep the plates to be coated nearly vertical. He then takes thin straps of zinc or copper, or of the coating metal and copper or zinc, projecting above the ends or sides of the trough when bent into its shape. He connects the projecting ends by a conducting metal, or by contact with each other. The ends thus united he curves downwards, and dips one termination into an acidulated

solution, the other in hot water, a heated sand bath, or an alkaline solution. The trough he insulates. He then fills it with a weak solution of the coating metal, stirs it well, and immerses the plates to be coated, placing them between the pegs, and in contact with the zinc or coating metal of the straps insulated.

PICKSTONE, W. *An improvement in preparing or manufacturing dyeing matter peculiarly applicable to cotton and other vegetable fibres and fabrics.* (A communication.) Dated Apr. 25, 1857. (No. 1176.)

This consists in producing colouring matter for the above purposes from the wood and bark of a tree which grows in the Brazils. The wood is of a blackish brown colour, surrounded by a lighter colour immediately under the bark. The tree is called Minas Geraes in the Brazils. The botanical name is Melanoxylon Braûna.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

CLAY, W. *Improvements in the manufacture of iron and steel.* Dated Apr. 20, 1857. (No. 1113.)

This has reference to a previous patent of the patentee, dated 20th Oct., 1856, and consists in covering in the open space in which molten metal is exposed, and forcing in air or gases through openings made in the cover or walls of this enclosed space, above the surface of the fluid metal contained therein.

TREEBY, T. W. G. *Improvements on syphons and parts connected therewith.* Dated Apr. 20, 1857. (No. 1115.)

The inventor has a cesspool made tapering, the small end at the bottom, fixed so that the end is directly under the bottom of the syphon. This syphon has a funnel mouth on the short end. A cock is fixed at each end of the syphon, connected with floats and levers. When the syphon requires charging, the cocks are closed, and a cock which is fixed on the top of the syphon is opened, and connected with this cock tanks are placed, so that the water passes in, expels the air from the syphon (letting in the water instead of pumping the air out). The cesspool is placed so as the bottom of it may be some distance below the bottom of the sewers, that the sewerage or heavy matter may have a fall.

WIMBALL, H. *Improvements in pug mills.* Dated Apr. 21, 1857. (No. 1116.)

This consists in the use of pug mills with two or more shafts or sets of knives. The shafts are geared together, and consequently rotate in opposite directions, and as the die or orifice for the passage of the exuding clay is placed between the shafts, the clay is more readily forced out than when the orifice is opposite the shaft.

FOURNIER, B. A. *Preventing on railways those accidents that occur through one locomotive running into another.* Dated Apr. 21, 1857. (No. 1117.)

This consists of apparatuses placed in the middle of each line of rails, moving backwards and forwards, and connected by wires within a distance of about 1000 yards. The locomotive passing over the first apparatus moves it, so that should another come immediately after the introduction of steam into the piston chamber, the locomotive would be instantaneously stopped. When the first locomotive reaches the next apparatus, it moves by means of the connecting wires the first apparatus, so that the way is made free for the next locomotive to go through.

GOSSAGE, W. *Improvements in the manufacture of certain kinds of soap.* Dated Apr. 21, 1857. (No. 1120.)

This refers 1st, to a method of manufacturing soap by a combination of the two kinds of soap produced respectively by the "open" and the "closed" process. 2d, to the manufacture of mottled and variegated soaps. The soap and colouring matters are introduced into a vessel containing a perforated plate, and when at a certain temperature are forced through the perforation in the aforesaid plate.

NEWTON, A. V. *Improvements in rules and other measuring instruments.* (A communication.) Dated Apr. 21, 1857. (No. 1121.)

This relates to the application to measuring instruments of various scales, so arranged as to allow of the measurement of circles, diameters, and the cubing of cylinders, or without making calculations.

MARTEN, E. *Improvements in apparatus for regulating the pressure and supply of gas.* Dated Apr. 21, 1857. (No. 1122.)

Here the supply pipe communicates with a chamber having one side connected by a flexible gas-tight material. With this chamber the continuation of the supply pipe is attached. There is a valve which is capable of sliding over the inlet passage to the chamber, so as to cover it, and its movement depends on the movement of the moveable side of the chamber, the valve being connected to such moveable side of the chamber. To regulate the pressure of the supply, the moveable side is acted on by one end of a weighted lever, and as the weight is varied in position on the lever, so will the pressure be varied.

SMART, H. *Improvements in organs.* Dated Apr. 21, 1857. (No. 1124.)

This consists in combining counting apparatus with the water engine which works the bellows of organs, to register the number of its strokes, and so measure the water employed. The inventor also, to obviate the shock produced by the sudden shutting off of the water, places on the supply pipe a cylinder in which a piston works, and a rod in connexion with this piston is attached to a lever mounted on an axis and carrying a weight, so that when the piston rises in the cylinder from the shock produced it gives motion to the lever, and raises the weight. The lever is so arranged that, as it moves on its axis, the weight acts with continually increasing effect on the piston.

CALLADON, D. *Improvements in means and machinery for boring and cutting stone, earth, and other like substances, and for ventilating the places where such machinery is employed.* Dated Apr. 21, 1857. (No. 1125.)

This consists in arranging stone cutting machinery worked by compressed air, so as to give motion by means of two connecting rods and cranks to two axes, which, by means of other cranks and connecting rods, give a to and fro motion to two slides, which slide in guide frames one on each side of the engine, a series of chisels or cutters being attached to each slide.

STEEL, W. *Improvements in discharging ashes from steamboats.* Dated Apr. 22, 1857. (No. 1127.)

Here the ashes from the boiler furnaces of the steamboat are discharged directly through a pipe or tube opening outwards through the bottom of the vessel, and rising internally in the engine room or near the furnaces to a higher level than that of the water outside.

HIGGIN, J., and J. LIGHTFOOT. *An improved compound and improvements in the method of applying the same for the purpose of stiffening fibrous or textile materials, the same being applicable to the fixing of colouring matters or pigments.* Dated Apr. 22, 1857. (No. 1129.)

This consists in producing tough elastic insoluble compounds of glue, glutinous, mucilaginous, albuminous, or gummy substances with metallic oxides or salts, such compounds being applied either direct to fibrous materials or by applying first the solution of animal or vegetable substance to the fibrous material, and afterwards the solution of metallic oxide, or *vice versa.*

WILLIAMS, W. *An improved propeller for propelling ships, boats, and other vessels.* Dated Apr. 22, 1857. (No. 1130.)

This propeller consists of an oar-like blade connected to a shaft depending from the vessel behind the rudder. The upper part of the shaft is connected to a horizontal shaft, to which a rocking motion is communicated. Upon the horizontal shaft being rocked, a *sculling motion* is communicated to the propeller.

OGDEN, W., and H. FIRTH. *Improvements in fans or blowing apparatus.* Dated Apr. 22, 1857. (No. 1131.)

This relates to centrifugal fans, and consists in mounting a circular disc on an axis, and attaching the vanes to the sides of this disc, those on one side of the disc being opposite to spaces between the vanes on the other side. It also consists in arranging the vanes of fans so that the spaces or passages for air between the vanes are the same area at the greatest distance from the axis as at the central opening or orifice, and this is accomplished by filling up the space behind each vane.

KENDALL, W. *Improvements in the manufacture of boxes and similar articles, and in the machinery or apparatus to be employed therein.* Dated Apr. 22, 1857. (No. 1132.)

This relates to certain lathe machinery for the manufacture of turned wooden boxes, suitable for pill boxes, &c.

GRANTHAM, R. B., and J., and H. SHARP. *Improvements in graving docks.* Dated Apr. 22, 1857. (No. 1136.)

Docks having separate chambers have been constructed either with fixed or temporary dams, but it is here proposed to construct them with piers and abutments, or with grooves only at intervals along the docks, so that a moveable caisson or dam may be applied to either of such piers, abutments, or grooves, as the length of the vessel may require. The docks are also to be supplied with suitable blocks, stays, &c., and culverts for letting water in and out.

RUTT, W. *Improvements in microscopes.* Dated Apr. 22, 1857. (No. 1139.)

Here a microscope is made with a chamber at the end of the eye-glass tube, for enclosing the object glass of the microscope, and the object to be viewed. The chamber shuts out the surrounding light, except from an opening at the end. Provision is made for introducing light at one side. By applying an erecting glass, and a telescopic object glass, at the end of the chamber, and removing the microscope object glass, the instrument may be used as a telescope.

WELCH, G. *Improvements in metallic pens and penholders.* Dated Apr. 23, 1857. (No. 1141.)

One form of fountain pens consists of a common pen having a tongue in its underside, between which and the pen a quantity of ink is held by capillary attraction. This

invention relates to this kind of pen, and consists in making the tongue capable of a sliding motion upon the pen. The pen-holders are made of a sheet of metal or blank of a certain form, and a tube of india-rubber, velvet, or other soft material is placed where the holder is held by the fingers and thumb.

HECHT, S. P. *Improvements in the manufacture of moulds for making fancy tobacco pipes and other ornamental articles from plastic materials.* (A communication.) Dated Apr. 23, 1857. (No. 1142.)

This consists in using soft materials consisting of fusible metals, or alloys of metals, such as tin, lead, zinc, bismuth, antimony, and quicksilver, and Darcet's fusible alloys, in lieu of the harder metals, in making such moulds.

MORISON, J. *Improvements in portable shower and sponge baths.* Dated Apr. 23, 1857. (No. 1144.)

Here the vessel in which the bather stands consists of an open hoop or frame, to which is attached by raised edges a disc of waterproof cloth, the bottom of which lies flat on the floor. The edges of this cloth vessel are raised more than sufficiently to contain the water which may be put into the vessel. The frame is made in two halves hinged together, so that when not in use the vessel may be folded into a small space. The head, or that portion which supports the can containing the water, is supported upon three moveable legs. The water is hoisted up to the head by means of a cord and pulley.

MILNES, D. *An improved manufacture of woven goods or fabrics.* Dated Apr. 23, 1857. (No. 1145.)

This consists in substituting yarns made from "silk noils" and "silk waste," instead of from animal wool, for the manufacture of that description of fibres in general wherein yarns made from wool have been hitherto employed; but the invention applies more especially to "moreens."

TAYLOR, J. *Improvements in apparatus for producing fire and light.* Dated Apr. 23, 1857. (No. 1147.)

This apparatus is chiefly intended for the use of smokers, and consists of a cylindrical metal tube open at both ends. One end has a loose cap upon it; the other has a sliding cap fitted inside, and both caps are joined together by a short chain. The tube is filled with tinder. When a light is required the user of the apparatus places it open between his forefinger and thumb next to the hand, and the flint employed in producing the spark is placed on the outside edge, both being held together whilst the flint is struck by a steel.

PARAZ, A. LA, and J. MAZEL. *Improvements in preparing paints and varnishes.* (A communication.) Dated Apr. 23, 1857. (No. 1154.)

This consists in substituting for the turpentine used in painting, the following composition:—1st, boiled oil; 2d, gum copal; 3d, brown sugar; 4th, purified white resin; 5th, gum arabic; 6th, carbonate of soda; 7th, nitre; 8, bitartrate of potash; 9th, bleaching liquid or eau de javel. In place of the oil usually employed the following composition is employed:—1st, glue; 2d, resin (colophomy); 3d, brown sugar; 4th, linseed oil; 5th, essence of turpentine; 6th, litharge; 7th, bleaching liquid or eau de javel; 8th, salt of tartar. And for a varnish, the following:—1st, gum copal; 2d, white resin; 3d, Venice turpentine; 4th, oil (prepared with oxide of manganese); 5th, an aromatic essence.

SWIFT, R. F., and R. and J. CORNES. *Improved machinery for washing, wringing, and mangling clothes or fabrics.* Dated Apr. 24, 1857. (No. 1158.)

The inventors employ an oblong vessel, divided by vertical partitions into three chambers, the two end chambers are washing chambers, and the central one a rinsing chamber. The two end chambers are provided with a number of cross bars or rollers. The clothes to be washed are placed upon these rollers, and the washing is effected by means of moveable dashers, which are joined to the lower ends of pendant rods, attached to the extremities of a vibrating lever or beam, the shaft of which is mounted in bearings in the framing. The wringing and mangling machine consists of two or more rollers or cylinders mounted in bearings in the frame work, their surfaces being made to press against each other by means of springs or other contrivances. One of these rollers is actuated by means of a winch handle, and the other is made to rotate by friction of contact.

BELLON, J. B. *Improvements in mordants for use in dyeing processes.* Dated Apr. 24, 1857. (No. 1161.)

This relates to the preparation of five different mordants to be used in dyeing. Mordant, No. 1, is prepared by combining in certain quantities oxalic acid and sulphuric acid with a solution of tin. This mixture is applicable to the preparation of wool for the reception of scarlet, crimson, flesh colour, pink, yellow, dove colour, orange, and other colours. No. 2, by mixing nitric acid with water until a temperature of 45° to 49° Fahrenheit is obtained. This is used in preparing wool for the reception of blue, green, and grey. No. 3, by mixing sea salt, sulphate of zinc, hydrochlorate acid,

carbonate of soda, and water, and is used for the same purposes as No. 2. No. 4, by grinding and mixing sulphate of iron, sulphate of copper, and tartaric acid. This is intended for wool, silk, felt, and cotton to be dyed black. The articles after being submitted to this mordant are dyed in a decoction of Campeachy wood. No. 5, is for dyeing black with one bath only. It is prepared by heating the decoction of Campeachy wood, then adding thereto sulphate of copper and sulphate of iron, and after heating the mixture nitrate of iron is added.

WALMSLEY, S. *Certain improvements in machinery for preparing and spinning cotton and other fibrous materials.* Dated Apr. 25, 1857. (No. 1165.)

This consists in apparatus for finishing the surface of the top rollers, and for preventing the fibrous material, when passing between the rollers, from accumulating on them. The inventor places pieces of glass, &c., within slots in the flats or clearers. These pieces of glass are loose in the slots, and when the clearer is in its place they bear on the surface of the roller to prevent the accumulation of fibres.

TONKS, S., and J. and W. BREEDEN. *A new or improved gas burner.* (A communication.) Dated Apr. 25, 1857. (No. 1166.)

This consists of an argand gas burner constructed of earthenware, china, or other earthy or semi-vitreous substance.

WHITE, W. *Improvements in making moulds or matrices employed in casting metals.* Dated Apr. 25, 1857. (No. 1169.)

This consists in ramming the sand round the pattern by the aid of a press. The mould boxes are brought underneath the press, and are rammed or packed by a descending plate or ram.

PRYNN, C. T. R. *An improved apparatus to be used for totally or partially benumbing any part of the human frame previous to a surgical operation, for the purpose of performing the said operations without pain.* Dated Apr. 25, 1857. (No. 1173.)

This consists of apparatus for forcing an inexhaustible stream of freezing liquid through thin tubular metal, lined outside with sponge, shaped according to the part of the human frame to be operated upon.

OLDERSHAW, A. P. *An improvement in apparatus for skidding the wheels of carriages.* Dated Apr. 25, 1857. (No. 1178.)

Here the drag chain adapted to the skid is arranged so as to be taken up or shortened when used for holding or retaining the shoe under the wheel, and so as to be readily lengthened when it is desired to release the skid and to allow the wheel to pass over it.

PROVISIONAL PROTECTIONS.

Dated November 5, 1857.

2806. Godwin Ratler Simpson and David Caldow Simpson, of High-street, Whitechapel, blind makers. Improvements in spring blinds.

Dated November 19, 1857.

2906. Philip Edward Coffey, of Bromley, Middlesex, engineer. An improvement in the process of distilling.

Dated December 16, 1857.

3088. James Thornton, of Nottingham. Improvements in apparatus used for the manufacture of carpets and other cut pile fabrics.

Dated December 18, 1857.

3114. Robert Oxland, of Plymouth. Improvements in the manufacture of alloys or compounds containing metallic tungsten. (A communication.)

Dated December 19, 1857.

3116. Asa Lees, of the Soho Iron Works, Greenacres-moor, near Oldham, machine maker, and John Clegg, of the same place, foreman. Certain improvements in looms for weaving.

3118. Richard Furnival, of Manchester, engineer. Certain improvements in machinery or apparatus for cutting paper, cardboard, and other similar articles.

3120. Richard Archibald Brooman, of 166, Fleet-street, London, patent agent. Improvements in signalling in order to prevent collisions between trains upon railways. (A communication from J. M. J. Degabriel.)

3122. John Bartlett, of Bristol, manufacturer. An improvement in weighing machines.

Dated December 21, 1857.

3128. James Hamilton, of Liverpool, shipwright. Improvements in ship-building.

3130. Robert Rennie, of Netherwood, Dumbarton, N.B., contractor. Improvements in self-acting trap doors for mines.

3134. James Tatlow, of Wirksworth, Derby, manufacturer, and Henry Hodgkinson, of the same place, engineer. Improvements in railway breaks, and in apparatuses for connecting shafts or rods for working breaks and signals.

3136. William Basford, of Lowther-cottages, Islington, engineer. Improvements in the manufacture of gas, and in retorts and other apparatus to be used therein.

3138. Richard Ford Sturges, of Birmingham, manufacturer. A new or improved manufacture of rollers or cylinders for printing fabrics.

Dated December 22, 1857.

3140. Samuel and Daniel Rodgett, of Blackburn, blacksmiths. An improved method of coupling and uncoupling railway, tramway, and other carriages, waggons, lorries, trucks, and other vehicles.

3142. Morris Landou, of Pudding-lane, City, cigar manufacturer. Improvements in cooking utensils.

3144. Edwin Maw, of the Doncaster Iron Works, Yorkshire. Improvements in ornamenting and strengthening metal tubes and rods with wood, applicable in the manufacture of bedsteads and other articles of furniture and framings, and also in the manufacture of the joints or connexions of the posts and framings of bedsteads, and other articles of furniture and frames.

Dated December 23, 1857.

3150. Augustus Frederick Kynaston, of Plymouth, a Post Captain in the Royal Navy, Companion of the Bath, and Knight of the Legion of Honour. An improved slip or disengaging hook.

3152. John Murray, of Whitehall-place, gentleman. Improvements in propelling ships and vessels. A communication.

3154. Alexander William Williamson, of Provost-road, Haverstock-hill. Improvements in treating scammony root and commercial scammony, to obtain the active principle therefrom.

PATENT APPLIED FOR WITH COMPLETE SPECIFICATION.

2. James Murphy, of Newport, Monmouth, civil engineer. Improvements in wheels used on railways. Dated 1st January, 1858.

NOTICES OF INTENTION TO PROCEED.

(*From the* "*London Gazette,*" *January* 12, 1858.)

2277. R. Whittam. Improvements in machinery or apparatus for ruling upon metallic rollers or cylinders for printing calico and other materials.

2296. E. Taylor. Improvements in looms.

2300. T. Hardcastle. Improvements in machinery for washing textile fabrics and fibrous substances.

2303. J. Petrie. Improvements in apparatus for regulating the admission of air to furnaces.

2304. G. F. Parnell. Improvements in the construction of hooks and eyes.

2309. H. Inskip. Improvements in fire-arms.

2310. J. Y. Borland. Improvements in machinery for preparing, spinning, winding, and doubling fibrous materials.

2312. P. B. Godet. Improvements in stereoscopes.

2314. C. W. Ramié. Improvements in constructing the permanent ways of railway.

2323. J. King. Improvements in the manufacture of boots and shoes, and in machinery for that purpose. A communication.

2327. P. A. de Fontainemoreau. An improved time-keeper dial, showing the exact time in different countries. A communication.

2328. S. Butler. A new or improved hearse.

2331. T. Goodchild. Improvements in stoves and fire-places.

2332. W. and W. H. Lewis. Improvements in plate-holders or frames for photographic cameras.

2336. U. Scott. Improvements in boots and shoes, applicable in part to shoes for horses.

2342. J. Marland. An improvement in the manufacture of cop tubes.

2350. E. Lavender. An improvement in distilling products from coal.

2362. J. Harrison. Improvements in apparatus for producing cold by the evaporation of volatile liquids in vacuo.

2363. W. Crofts. Improvements in the manufacture of various weavings in bobbin net or twist lace machinery.

2364. G. Brüninghaus. Improvements in the treatment of iron ore (crude iron) for the production of iron and steel.

2400. C. W. Lancaster. An improvement in breech loading guns and in projectiles for the same. A communication.

2421. S. Whitehead. Improvements in "trowsers" as part of male attire.

2422. S. Faulkner. Certain improvements in machinery or apparatus for carding cotton and other fibrous substances.

2437. W. H. James. Certain improvements in steam vessels, parts of which improvements are applicable to sailing and other vessels.

2687. J. B. Slawson. An improvement in boxes for receiving the fares of passengers in public conveyances, for the prevention of fraud on the part of the persons authorized to attend to the receiving of the fares, as well as on the part of the passengers. A communication.

2938. G. Lowry. Certain improvements in machinery for heckling flax and other fibrous materials.

3054. J. Chadwick, and A. Elliott. Improvements in machinery for spinning, doubling, and throwing silk.

3144. E. Maw. Improvements in ornamenting and strengthening metal tubes and rods with wood, applicable in the manufacture of bedsteads and other articles of furniture and framings, and also in the manufacture of the joints or connexions of the posts and framings of bedsteads and other articles of furniture and frames.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

31. Robert Ashworth and Samuel Stott.
42. William Grindley Craig.
63. William Thomas Henley.
66. Henry Bessemer.
67. Henry Bessemer.
71. John Norton.
72. Alexander Robertson.
88. William Barningham.
99. John Charles Pearce.
123. David Davidson.

LIST OF SEALED PATENTS.

Sealed January 8th, 1858.

1892. William Edmondson Jones.
1893. John Talbot Pitman.
1895. Thomas Frederick Henley.
1935. Francois Burot.
1940. Murdoch M'Kay and Henry Forfar Osman.
1962. William Henry Gauntlett.
2006. Joseph Conway.
2010. Frederick Warner.
2032. William Johnson.
2046. George Tomlinson Bousfield.
2052. Octavius Henry Smith.
2104. John Elce.
2160. George Tomlinson Bousfield.
2174. George Tomlinson Bousfield.
2616. Thomas Bell.
2682. Frances Windhausen.
2746. Joseph Fry.

Sealed January 12th, 1858.

1941. Henry Starr.
1943. Nicholas Williams and Thomas Williams
1954. Henry Hebblethwaite, William Shuttleworth, and William Tasker.
1956. William Stettinius Clark.
1959. Gustavus Palmer Harding.
1963. François Moulin.
1964. William John Locke.
1972. Wright Jones.
1973. James Wright.
1974. John Cox.

1977. George Samuel Mathews.
1985. Thomas Clunes and John Macintosh.
1988. Thomas Roberts and John Dale.
2005. Henry Vennor Cowham.
2017. Joseph Kirby.
2054. George Tomlinson Bousfield.
2083. Thomas Forsyth.
2149. William Edward Newton.
2185. William Edward Newton.
2318. Archibald Turner.
2460. William Edward Newton.
2583. Thomas Massey and Thomas Savage.
2639. Thomas Richardson.
2661. Thomas Massey and Thomas Savage.
2674. William Edward Newton.
2697. Thomas Cardwell.
2731. Abel West.
2757. William Clark.
2883. Solomon P. Smith.

NOTICES TO CORRESPONDENTS.

Several letters are standing over till next week.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

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CAPTAIN KYNASTON'S PATENT SLIP OR DISENGAGING HOOK.

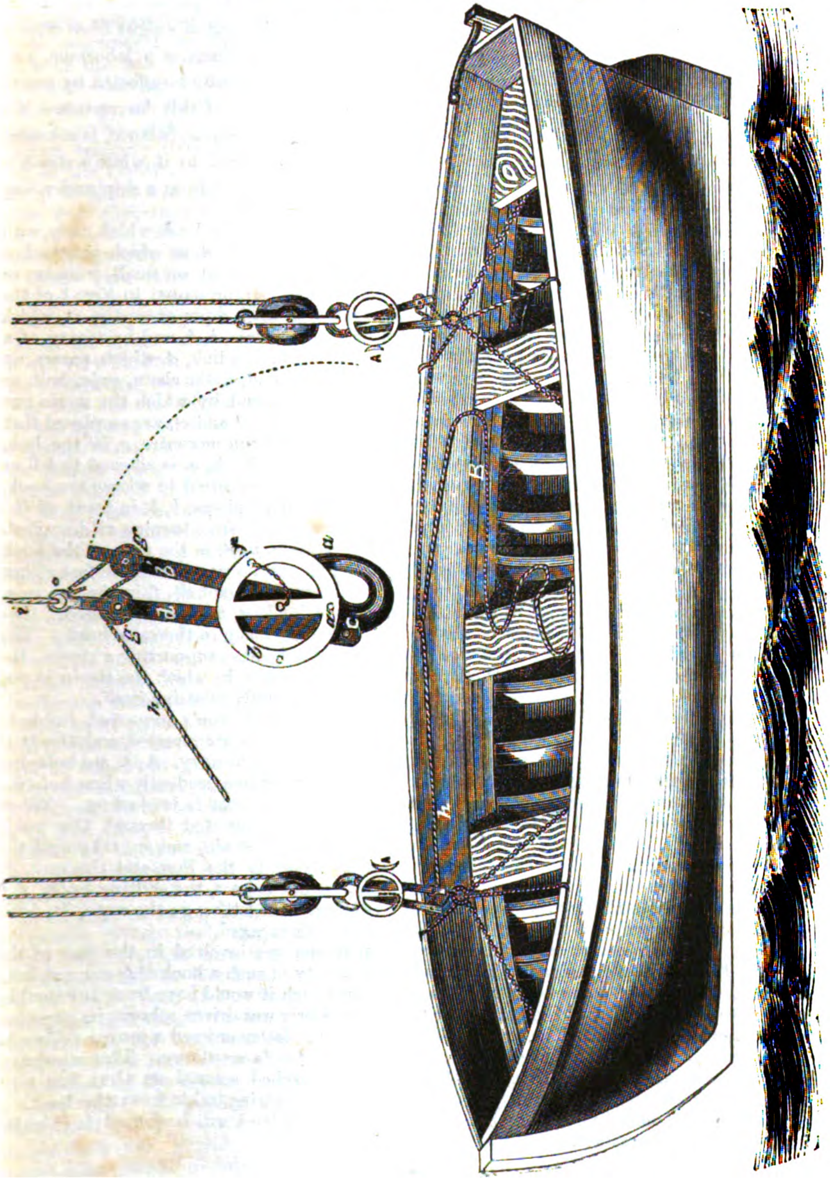

Fig 1.

Fig. 2.

CAPTAIN KYNASTON'S PATENT SLIP OR DISENGAGING HOOK.

Captain Kynaston, C.B., R.N., whose apparatus for lowering ships' boats was recently described in this Magazine, has subsequently invented and patented a slip or disengaging hook which possesses several important merits. It is well known that the use of a jointed hook has been found of advantage for many purposes, such as the disengagement of the lowering tackle from ships' boats, the loosing of weight from cranes, &c. The detachment of heavy purchase blocks themselves, which is a laborious, and sometimes a hazardous operation on board ship, might very usefully be effected by means of a properly-constructed jointed hook. But the principal hook of this description—Mr. Shore's—in which the disengagement is effected by the use of a counterbalance, is attended by the disadvantages that it will not release the object attached to it while a strain is exerted upon it (which is always the case when a boat is lowered from a ship under way for example), it is liable to accidental disengagement by jerks, &c.

Now the object of Captain Kynaston's invention is to provide a hook which may with ease and certainty be released from any body to which it is attached, or which is attached to it, whether the pressure or pull exerted upon the hook be great or small, uniform or variable; and the invention consists of a hook constructed as represented in Fig. 1 of the engravings on the preceding page. He mounts a hook, *a*, upon a pin or centre, *a′*, which is supported by and between two curved plates or guard pieces, *b*, *b*, and by means of a second pin or centre, *c*, connects to the back of the hook, *a*, a link, *d*, which passes up between the plates or guard pieces, *b*, *b*, and receives at its end, *e*, the chain, rope, bolt, or other object, to which the hook itself is to be connected, and by which the strain put upon the hook, *a*, is to be borne. The two pins, or centres, *a′* and *c′*, are so placed that when a strain is put upon the hook, *a*, it will turn about the pin or centre, *c*, in the link, *d*, until the loop or eye by which the strain is put upon the hook, *a*, is allowed to fall or slip freely from it. To prevent this occurring, except when it is desired to release the hook, a shifting pin or bolt, *f*, is passed through the plates or guard pieces, *b*, *b*, in front of the stem, *b′*, of the hook, *a*, to form a stop to prevent the said hook from turning as described. The same end may be attained by placing pulleys or sheaves, *g*, *g′*, in the ends of the hook stem and of the link, *d*, through which pulleys a line, *h*, may be rove and made fast either to the link, *d*, or elsewhere. By withdrawing the aforesaid pin or bolt, *f*, in the one case, and by loosening the line or cord, *h*, in the other, the hook, *a*, will be disengaged. The two arrangements may be sometimes combined advantageously in the same hook. The plates or guard pieces, *b*, *b*, are so formed that when the hook is supporting a strain, the point of the hook, *a*, lies between them; and the loop or eye, *i*, by which the strain is put upon the hook, *a*, is thus effectually prevented from accidentally releasing itself.

At Fig. 2 we have shown a plan of applying Captain Kynaston's improved hook to relieving tackles for disengaging a boat. In this Fig. the hooks are inverted, and the boat is supposed to be hung as heavy boats are commonly hung in the navy. A, A, are belaying pins added to the hooks for enabling each hook to be secured independently when hoisting up a boat, a man to each rope or line, *h*, securing them as the boat is hooked on. When the boat is hoisted up, the shifting bolts, *f*, *f* (Fig. 1), are inserted through the guide plates, *b*, *b*; the tackle, ropes, or lines, *h*, are thus relieved of strain, and are taken off the belaying pins, A, A. The ropes, *h*, are connected as shown in the Fig., and the end, B, being hauled taut and secured in any convenient part of the boat, the shifting bolts, *f*, *f*, are taken out, when the boat will be ready for lowering. On letting go the rope, B, both hooks will be opened, and the boat will be immediately disengaged.

It will be manifest to our nautical readers that changes involved in the use of the improved hook are of the simplest kind, and of the utility of such a hook *they* cannot have a doubt. It may not be amiss to mention a case in which it would have been invaluable. On the coast of the Bay of Biscay a short time since a brig was driven ashore, in presence of a man-of-war steamer. The commanding officer of the latter ordered a junior officer to have a boat lowered, and take certain measures for the brig's assistance. The wind and sea were very high at the time, and the officer despatched assured us that his men expended *fifteen minutes* in endeavouring to unhook the lowering tackle from the boat.

We must not omit to mention that Captain Kynaston's hook will be found invaluable for releasing towing cables.

ENGLISH AND FRENCH RAILWAYS.

At the Meeting of the Institution of Civil Engineers, on the evening of Jan. 12, 1858, Joseph Locke, Esq., M.P., President, who occupied the chair, delivered an address on the principles and character of the French railway system. This, he said, he was encouraged to attempt in consequence of the late President—Mr. Robert Stephenson—having so fully discussed the main features of English railways, the origin, progress, and results of which were in many respects strikingly dissimilar to those of the Continent. The practical results in England had been immense convenience and advantage to the public who used, and inadequate profit to those who had constructed, the railways; but in France the terms were reversed, the capital invested yielding a good profit, whilst the service to the public, although far in advance of all former means of conveyance, was still very limited.

In contrasting the systems, it would be shown that the real difference was greater than was apparent on a mere comparison of per centage of income and profit; and that other things being equal, the advantage might be assumed to be in favour of England, in all that was essential to the success of improved communication; and all circumstances being considered, the result should have been a higher rate of profit from railways in England than in France.

The essential characteristics of the French system were, he said, first, the determination by the State of the locality and direction of the main arterial lines of railway; and, secondly, the process which the State, whilst adhering to its general rule of absolute control over the selection of lines, had thought proper to employ in order to obtain the desired progress in their construction.

A comparison of the expense of construction of the French and English railways exhibited an unfavourable picture of the latter; the estimated cost of the former being about 24,688*l*. per mile, whilst that of the latter was about 31,690*l*. per mile. The causes which swell the expenses of English railways had been fully stated by Mr. Stephenson, the late President; from many of them, such as the Parliamentary proceedings, and the effects of the rivalry of other lines in the respective districts the French railways were exempted. The physical features of the country, rendering for the most part unnecessary the viaducts, tunnels, and other expensive works, which distinguished the English railways, contributed also much to reduce the cost of construction. The cost of railways would probably be diminished in future in England, whilst in France they had not yet reached the culminating point, as between the years 1841 and 1854 the cost had gradually increased from 18,600*l*. per mile to 26,664*l*. per mile.

The limited service for the public on the French lines was then noticed, and it was shown that, as compared with the English system, it was deficient. This induced economy and influenced the profits, but still the cost of fuel and of all that belonged to the locomotive power was greater than in England.

Referring to the absolute engineering construction of French railways, there was little to occupy attention, as they were almost entirely imitations of those which had been already completed in England, where the experiments were tried, and where both the engineers and the operatives had to acquire their experience practically.

Several instances were given by the President of his own personal experience in the construction and maintenance of French railways.

Large manufactories of engines had been created there, equal to the supply of the wants of the country, and English mechanics were now scarcely seen on any other than the Rouen Railway. Neither the precision of manufacture nor of manipulation had, however, yet reached the English standard; nor had the economy of working been brought so low, notwithstanding the speed being lower, the wages being less, and the trains less frequent, better filled, and carrying less dead weight.

In absolute construction there was little to remark. The masonry was more lavish in quantity; the slopes of cuttings were not flat enough, and were frequently pitched with stone; the rails were chiefly the double-headed parallel, as first used on the Grand Junction Line in England; the gauge was identical with the English standard, and uniform throughout the country; and the permanent way generally differed but little from the majority of the British lines.

One national peculiarity was the employment of females in the booking offices, level crossings, &c., and other departments, to the duties of which they were found well adapted.

In the conduct of works, there was a manifest difference between the proceedings of the English and the French engineers; the former personally examined the ground throughout, planned the works, superintended the execution, constantly inspected the progress, determined every proceeding,

met every difficulty, and assumed the responsibility of the entire works. The French practice was in many cases the reverse. There was in it a great appearance of organization; but it could hardly be deemed an efficient substitute for the less formal, but more direct process of individual supervision, by which the engineer was brought into personal relation with the difficulties with which he has to contend and the forces he has to wield.

Another peculiarity of the Continental system was the detrimental influence exercised by the Government engineers of the "Ponts et Chaussées," as "controleurs," whose presence affected the railway system by their frequent demands or suggestions, which, although of no legal force, were generally submitted to. The President bore testimony to the consideration with which he had been individually treated in his Continental undertakings, but even that could not blind him to the defects of the system.

Iron Ship-building; with Practical Illustrations. By JOHN GRANTHAM, Consulting Engineer and Naval Architect, Liverpool. London: John Weale, 59, High Holborn; and St. Mary's, Cambridge. 1858.

IN the year 1822 a small iron steamer, the *Aaron Manby*, left the Thames on her first voyage, and proceeding across to Havre, ascended the Seine, and reached Paris. This little vessel was in charge of that Charles Napier whose latest command was that of the British fleet in the Baltic; and was, according to Mr. Grantham, the first *iron* vessel which ever put to sea, and the first iron *steam*-vessel ever constructed.

Since that time fleets of iron steam and sailing ships have left our shores; they may now be found on every sea, and their commercial success is no longer questionable.

The little book before us professes to give the successive stages of improvement which iron ship-building has undergone during this period—to review its "origin, progress, and present position." It is written by a gentleman who tells us that, for a period of thirty-three years his mind has been constantly directed to the subject, that he has been engaged in building several large iron ships, and that during the last fourteen years he has designed and superintended the construction of many more, an occupation in which he is still engaged. We too commonly find that the men whose experience would render them eminently capable of writing on practical subjects, do not write instructively because of a want of method, resulting from a defective intellectual education. Mr. Grantham, however, whose experience is of this character, writes clearly and well, and has produced a work of uncommon excellence.

The text is accompanied by an atlas of twenty-four lithographic plates, giving detailed information of the modes of construction in the *Leviathan*, and in iron ships generally; drawings of the various machines in ordinary use for facilitating the operations, and others explanatory of the derangement and correction of the compass, &c.

The references to the plates have been so restricted as to render two-thirds of the text complete without them; the cost of the plates being necessarily such as will place them beyond the reach of many who would still derive useful information from the text, which may, we believe, be purchased separately.

Our scientific readers will find in the matters treated of in these pages, in addition to the practical information there detailed, some very interesting subjects for study; for example, the compass derangement, and the fouling to which the bottoms of iron ships are subject. Mr. Grantham has put this latter question very clearly, and we hope it will not be long before some really efficient means are discovered for overcoming this great obstruction to the use of iron.

The whole subject is, however, a national one, and Mr. Grantham says very properly:—

"One cannot reflect on the state of English ship-building without perceiving that some great alteration is necessary in order to place it in its proper position. The price of new ships is too much reduced to allow room for profit, when labour and timber are so expensive as in this country; and I believe it is generally acknowledged that our ship-builders mainly depend for subsistence on repairs alone. But is it right, I would ask, that a large and respectable class of men whose profession should, from its importance, enable them to rank as high in wealth and station as they do in intellect—whose occupation requires the attainment of great scientific skill, should have their talents thus degraded—their energies thus cramped? Is it right that, in a land whose merchants are princes—in a land which

claims the boundless ocean for its empire—the men who have spent their lives in so important and national an avocation should have no fair remuneration for their services? And where can we see any any prospect of improvement while timber alone is employed, and while our population (already so dense) and the circumscribed limits of our soil for ever deprive us of the power to grow timber in sufficient quantity for our own ships?

"But let iron become the material with which our ships are henceforth to be built, and the whole question assumes a widely different and a highly cheering aspect. Without being in any degree dependant on foreign countries, we should find an inexhaustible supply of more suitable and less perishable material for the whole of our national and mercantile marine in our own country; from this source our iron-masters would have a fresh and a steady demand for their iron, and an increased demand for labour, both at the mines and in our building-yards, would be the immediate and invaluable result.

"If I have not overrated the superiority of iron in what I have advanced, it is clear that few foreign timber-built vessels could compete with our iron ships; and if other countries are driven to the use of iron there can be no doubt where the advantage will be. All nations yield the palm to England in the production and working of iron, and it will be long before we can be deprived of our superiority in this respect."

Mr. Grantham thinks that the destructive effects of shot upon iron, and the necessity for cleansing the bottoms of iron ships at least once in six months, renders this material unfit for ships of war. We are not so sure of this: the advantages attendant on the use of iron would be so important, and the difficulties in procuring timber are so great, that we do not think the day far distant when English oak will give way to British iron, and our wooden walls will at last find a conqueror. More than half the timber now used in our war ships is imported, and we are sure that the Government would be very glad to know where they may get still more to meet the urgent demands made upon them for large crooked timber.

We think that two statements made by Mr. Grantham are calculated to mislead. One of these is that "the weight of *iron* necessary in the construction of a vessel" is "very much less than the weight of *wood* required for the same purpose." Now, we have no hesitation in saying, that a vessel may be built of wood on the diagonal system, as in the case of the *Banshee*, Royal yacht, &c., with as little weight of material as would be required were it built of iron. Of four *similar* vessels which we know, three of which were built of iron, and one of wood (bread and butter fashion), two of the three iron ones were heavier than the wooden one. And then, under the head of stowage, Mr. Grantham must certainly have made an error in the calculation on which he bases the statement that the iron ship of 600 tons burthen would not exceed in outward dimensions the timber one of 500 tons, the outward dimensions in question being, we imagine, the breadth for tonnage, and not the breadth to the outside of the walls. We think that in these two cases Mr. Grantham has been guilty of a little exaggeration—pardonable enough perhaps, considering that he undertakes to show that iron ships are better than wooden ones in *every* respect.

In conclusion, we recommend the book most heartily, not only to professional men, for whose especial benefit a portion of it is written, but to the British public generally, to whom it cannot fail to be deeply interesting.

FENTON'S IMPROVED FEED PIPE CONNEXIONS.

Fig. 1.

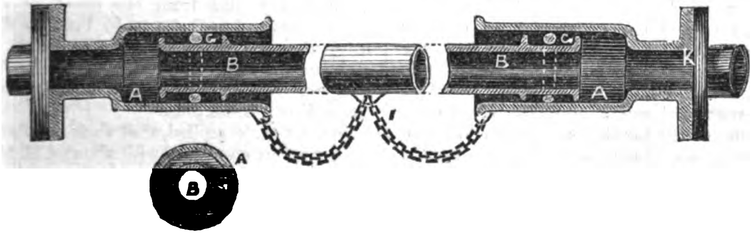

Fig. 2.

Fig. 1 of the above engravings is a longitudinal section of an improved feed pipe, recently introduced by Mr. James Fenton, the able engineer of Low Moor

Iron Works, and described by him at the Institution of Mechanical Engineers. Fig. 2 is a transverse section. AA are two cylinders of brass or iron, one of which is bolted in the usual manner to the feed pipe of the engine, and the other to that of the tender; they are both bored out smooth and parallel. BB is a connecting tube of brass or iron, having the ends turned. GG are elastic rings of vulcanized india rubber, which when at work roll between the cylinders AA and the connecting tube B. II are light chains used for the purpose of keeping the tube B in its proper position; they are each left slack to an extent of one half the greatest amount of travel required between the engine and tender.

The advantages which this arrangement appears to possess are its extreme simplicity, and consequent cheapness both in first cost and current repair; and the great durability of the only wearing parts, the motion of the elastic rings when at work being a *rolling* instead of a *rubbing* action. Also the absolute tightness of the joints when steam is blown from the boiler into the tender tank, as the elastic rings GG are then forced up against the collars on the tube B, for the purpose of enabling the rings again readily to adjust themselves to their proper position when the pressure is removed, which they do as soon as the engine is put in motion.

The india rubber rings G are made slightly larger than the space into which they fit, for the purpose of ensuring a thoroughly water-tight joint; the cylinders A are $3\frac{1}{16}$ inches inside diameter, and the tube B 2 inches outside diameter, as in the figure; the ring is made $3\frac{1}{8}$ inches outside diameter, and $1\frac{3}{8}$ inch inside diameter, the section of the ring being a circle $\frac{5}{8}$ inch diameter.

Should either of the tender valves get out of order on the journey, and it become necessary to stop the feed by other means, it is only requisite to slack back the bolts which hold the flanges together, and introduce a piece of sheet iron or zinc between them, of sufficient width to cover the orifice of the feed pipe. This simple and effectual mode of stopping the feed was suggested and adopted by Mr. Ramsbottom, of the London and North Western Railway, on which, as well as on several other lines of railway, this water connexion has been in successful operation for several months.

After Mr. Fenton's description was given at the above-named Institution,

Mr. Ramsbottom said he had had one of these coupling pipes in use rather more than two months on a locomotive, and it had worked very satisfactorily.

Mr. Craig had had one of them at work about three months, applied to a stationary force pump working under 300 lbs. per inch pressure, and it had proved quite successful. He had now applied them to several locomotives, and was well satisfied with the results.

Mr. T. Forsyth thought there was no doubt of the success of the plan with cold water, as shown in Kennedy's water meter; but he understood that when fixed near to a boiler for measuring the feed water, the india rubber ring was found to be injuriously affected by the heat; and he feared that when used much with steam blown through into the tender, the rings would not be found to stand.

Mr. Fenton said, he expected they would prove quite satisfactory in that respect, as some of the couplings had already been working three months with the original rings, in regular work, exposed to the ordinary blowing through of steam into the tender; and the rings were still at work, showing no sign of injury. But even if they were frequently worn out, the whole cost of maintenance would be very small, as it cost only 6*d.* each to renew the rings, or 2*s.* per set.

Mr. Siemens remarked that the vulcanized india rubber was manufactured at a high temperature, above 300° Fahr., and was not injuriously affected by exposure afterwards to a lower temperature; it proved very durable if its elasticity was not brought into action too severely, but a kneading action was very destructive, by breaking up the cohesion of the mass.

Professor Rankine had used an india rubber ring to make a steam joint at as high a temperature as 550°, in a model where it was exposed to steam at about 1,000 lbs. per inch, and it had stood well if undisturbed; but when the joint had been several times broken, the india rubber was found to fail. India rubber suffered great injury also from the effect of oil, which caused its substance to become disintegrated or broken up.

The Chairman inquired what was the comparative cost of the new couplings and the ordinary brass ones.

Mr. Fenton replied, that their cost was 2*l.* per set as compared with about 12*l.* 12*s.* for the brass ball and socket couplings being only about one-sixth in first cos and there was also a considerable saving in cost of maintenance. The rolling action to which the packing rings were subjected did not appear to be injurious to their material, as they had already run upwards

of 8,000 miles without any sign of injury, although exposed to the heat of blowing steam into the tender in the ordinary manner.

THE CHEMISTRY OF PIGMENTS.
No. III.

BY DESMOND G. FITZGERALD.

"It is easier to find fault than to supply a remedy." This axiom applies in most cases, and may be said to apply to our objections to pigments now in use—or rather to their manufacture and indiscriminate employment. But with regard to the latter point the remedy is in the hands of all those who use pigments; and it would be more so if our advice respecting *labelling* were adopted. Time and many careful observations are, on the other hand, requisite to determine the value of any new product; but it cannot be doubted that chemistry will ultimately effect great improvements in the materials of art.

When to "find fault" is both easy and reasonable, a remedy should at least be sought. Tallow was found too soft and too oily for candles; as soon as an objection was raised to this a remedy was also found; and *stearine* now replaces the crude material with advantage. In our oil colours the *absence* of stearine may be equally desirable; and if so, experiment and the test of time can alone prove the fact. The first practical step is the separation of oleine from stearine: this is generally effected by a diminution of temperature; but perhaps some of the readers of the *Mechanics' Magazine* may be able to suggest a more perfect and perhaps a readier method.

It will not be denied that improvements are required in the manufacture of the artist's materials. That this is the case is sufficiently exemplified by the present condition of such pictures as the *Hookabadar* and *John Knox* of Wilkie. But this improvement does not seem to be wished for, nor perhaps would it be sufficiently appreciated.

Few considerations, however, should be of more importance to the artist than the permanency of his work; and yet scarcely has it quitted his easel before its beauty is marred by twenty different causes. The lakes and browns fade; the lights become yellow, lead colour, or black; the blues change to green, and the yellows to brown. Besides this, several colours commence mutually to decompose each other, and the painting becomes covered with a net-work of cracks. Nor are these things extraordinary when we consider that the artist depends for every material of his art, not like the old masters upon a laboratory beneath his own roof, but upon a tradesman possessing, in the generality of instances, neither the science to understand the nature of the substances he vends nor the will to forego the most profitable part of his business, viz., the disposal of cheap and questionable pigments as "artist's colours" in preference to purer and higher priced articles. It is true that the present system works comparatively well, artists having generally a good practical knowledge of the colouring material they employ; but when we consider the importance of the interests at stake, the beauty and permanency of the productions of modern art, we cannot but see the necessity of leaving nothing to chance in a matter of such moment, and the expediency of subjecting to a rigid scientific scrutiny every substance employed by the artist.

The agencies by which the permanent nature of a pigment is put to the test are: 1st, light; 2d, impure air, containing sulphuretted hydrogen gas; 3d, oil, sulphur, and arsenic, with which it may be associated; and, 4th, under the present system of "restoring pictures," potash, soda, and their carbonates. By the first of these agencies—light—the vegetable browns are to some extent bleached; this effect, however, is partially obviated by the addition of wax or other unctuous substance, by which also is prevented the *cracking* to which these pigments are particularly liable. Indigo also fades rapidly in the light; and the vegetable reds, lake, and cochineal, are quickly discharged by it.

Sulphuretted hydrogen gas is evolved from putrefying substances containing sulphur. It exists in the gas of sewers and drains, and, reeking into the atmosphere, collects principally in the squalid habitations of the poor, though it may often be detected even in the gilded *salons* of the rich. It is as detrimental to all paint having for basis the oxide of lead as it is prejudicial to animal life. Whenever the lead paint of houses is blackened or discoloured the insidious and deadly gas is known to be at work.

The colours which are deteriorated or destroyed by the agency of this gas are:—flake white, pearl white (magistry of bismuth), massirot, litharge, chrome yellow, chrome orange, red lead, Scheele's green, Naples yellow, patent yellow, and some few others.

The colours which change by an admixture of oil are the mineral yellows (chromates of cadmium and tin), and nearly all the compounds of copper; such as Scheele's

green, mineral green, verditer and verdigris greens, which darken with oil, and verditer blue, which turns green.

We have alluded to the cleaning of pictures, which are frequently "restored" by an alkaline detergent containing potash, soda, or their carbonates. The colours which are immediately destroyed by the application of these alkalies are Prussian blue and Prussian brown. Alkalies also unite with every description of oil, or oily matter; and thus the "Alkaline Detergent" is perhaps the most destructive of all the substances by which a painting can be attacked.

We will for the present conclude our observations upon the "Chemistry of Pigments," with the hope that they may direct attention to this important subject. Had the opportunities we at present possess of using our chemical knowledge for the advantage of art existed in times past, the terms "freshness" and "sweetness," formerly applied with reason to works now pronounced "dull" and "leathery," might be applicable at the present moment. To the real lover of art the future fate of his own compositions, or of the works he may purchase, cannot be a matter of indifference; and by him at least will be admitted the necessity of Science applied to Art.

ON PERPETUAL MOTION.

BY GENERAL T. PERRONET THOMPSON, M.P.

SEARCHES after what is known by the name of a Perpetual Motion have been at all times so common, that it cannot be without use to endeavour to ascertain and set down the circumstances under which such a phenomenon is possible, or the contrary, with the reasons why.

The innumerable attempts at Perpetual Motion from time to time made known, fail generally by running against two canons which nature has set up, and which it is not in man to bear down;—that action and reaction are equal, and that the velocities of the power and weight are inversely as those forces. And it is not unamusing to see how curiously these truths may be disguised, and yet with what certainty they will spring out on the hapless projector, at the moment he thinks, good easy man, his success is in the act of ripening.

The old books of "rare inventions" deal in speculations of this disappointing kind. They conceive of balls, rolling down an inclined plane or series of planes, and, by some crafty modification of art, acquiring velocity enough to carry them to the place from which they came. Or, they pour water on an overshot wheel, with intent that this shall turn machinery to pump the water up again. When the great mechanic of antiquity declared he would move the world if anybody would show him where to fix his machine, why should these apparently minor performances be beyond the reach of man? Simply, because the one offers no contradiction to the canons above named, and the others do.

To one who has never reflected on such subjects, it would look like a comparatively easy thing to make a watch which should wind itself up. Why should not the watch before running down, let loose some kind of spring which should have the effect of winding it up? and why should not the motive-power during the motion, or a part of it, be directed to restoring such spring gradually into its place for another effort? It might require much calculation to demonstrate the impossibility in an actual case; but to impossibility it would come.

A friend of early days went to considerable expense with a machine consisting of a cylinder which turned on friction-wheels, and to its circumference were attached certain arcs or arms of brass, with a weight or ball at the end, and these were expected to turn or fall into a position approaching the horizontal on one side of the cylinder, and lie snug upon the other. But when tried, it moved for a short time when set in motion, and then stopped; the projector expressing his surprise at the very small help required to make it continue in motion. It was suggested to him to put quicksilver into the arcs or arms, which should run outwards in one of their positions and back again in another; with which he was much elated, but nothing came of it. It was evident, in all these cases, that when the machine stopped there was an exact balance in all its parts, and no surplus of force anywhere by which any motion could be continued.

I knew a boy who was met by this hostility of nature, in a form distinct from any mentioned. He tried to draw water out of a vessel with a siphon, and with another to carry it back again. And so impregnable was he to the light, that he even tried to set his siphon afloat on a kind of raft in a tub of water; nothing wotting that for a siphon to act, the spouting end must be lower than the surface of the fluid. Grown men have followed not less hopeless tracks.

But though there is no making a perpetual motion by the simple application of mechanical force, there is no difficulty in making what may be called so by the help of certain natural powers, if we can get them; and this by the token that nature is

full of perpetual motions. And it is not at all unlikely that by some application of these, something very novel and important may be forthcoming. A mill on a perpetual stream is a Perpetual Motion, because the stream is. And if we ask, why the stream is perpetual, it is because the sun to-day, yesterday, and as long as the world shall last, is drawing up water from the sea by evaporation, which in the absence of the sun condenses itself into the shape of rain, some of which falls into the sea again, and what falls on the land forms rivers. So that the result may be traced to two facts,—that the sun is perpetual, and that the world turns round without stopping. Give us a piece of the sun to be a perpetual fire without stoking; or allow us to hook on to a star in the celestial equator while the world turns round;—and we will make a railway engine which shall run its way rejoicing and never stop.

If the force of magnetism had been capable of being intercepted like light, it would have been possible to make a perpetual motion by the attraction of a magnet on steel points in the circumference of a wheel. And here there would have been one of nature's perpetual forces, which man cannot copy. There are ideas abroad, that something of this kind is to come of electricity; though how we are to have electricity without working an electrical machine, does not appear.

On the whole, however, there is nothing hopeless in the expectation of great results from some of nature's perpetual forces. And one of the first means towards such an end, is to cultivate an acquaintance with the impossible which is to be kept clear of.

COMPOUND SHOT FOR RIFLED CANNON.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—The able manner in which your Correspondent, "L.," exposes the attempts of the *Times* to take advantage of the ignorance of the general public as to ordnance matters, for the purpose of unfairly and untruly puffing Mr. Whitworth, induces me to forward you the particulars of an invention which, although not novel, has not yet been described in any scientific or other journal. It is that of a compound shot for rifled cannon, and was patented several years ago. It is made of zinc and lead in about equal proportions, and its advantages are as follows:—The melting points of zinc and lead being nearly the same, the two metals can be combined while in a state of fusion. The zinc (the harder metal) is much lighter than lead, and consequently, when the metals are mixed together in a mould, the zinc floats on the surface like oil on water, a property which allows the mixture to be accurately proportioned, and also to give a certainty that the harder metal shall not MIX with the softer, but be invariably massed together at the top point of the shot. Lastly, the shot being composed of a harder metal seated on a softer one, when it (the shot) strikes an object, the base of the shot yields a little, and thus preserves the fore-part from injury, while it doubles the force of the stroke.

This is a theoretical view of the matter, but it has been confirmed by practice at Woolwich to the letter. A 12-pound shot was, at 200 yards, projected through an oaken bulk-head two feet thick, and thence eighteen feet into solid clay, without the slightest change of form. These compound shots have been made and tried from the size of the Enfield rifle to that of an 80-pound shot. The last has attained a range of 4100 yards at ten degrees of elevation, and the speed was 2,700 yards in seven seconds.

These several particulars fulfil all the requirements of a perfect rifled cannon shot; the base is soft enough to expand thoroughly without injuring the gun, while the point in combination with it makes the whole projectile harder and more effective than iron. The reason that the shots above described have not long ago been introduced into the service it would be hard to give. They have been tried; in fact all the experiments have been made under the eyes of the Select Committee at Woolwich, and even that fastidious body has acknowledged their success. The Government—meaning thereby the Secretary of State for War—has repeatedly promised to give a decision respecting them, and has never yet done so, although the want of improved cannon and projectiles is felt and must be felt as long as improvements in musketry go on.

The history of the Lancaster Shell, now said to be given up—its enormous cost, in experiments, manufactories, and guns, and the reckless sacrifice of British soldiers by the perpetual bursting of the guns,—furnishes the only clue to the matter, viz., that private interest is superior in the Ordnance Department to the claims of the public service.

I am, Sir,
Your most obedient servant,
J. LAWRENCE.

20, Great Charlotte-street, Blackfriars,
Dec. 31, 1857.

[The concluding sentence of the above letter affords an example of what is very

common, but at the same time, very unfair criticism of Government proceedings. During the Russian war, when everyone was urging the Government to the adoption of improved ordnance, most satisfactory results were obtained with Mr. Lancaster's guns. The Government accordingly adopted them, and made the necessary arrangements for manufacturing them in suitable numbers. It appears to us most unfair now to impute these proceedings to private interest, because subsequent experience proved less favourable, or apparently so, to the new cannon. If such criticism were heeded it would put a stop to the introduction of new inventions altogether.—Eds. "M. M."]

CHOLERA AND ITS PREVENTION.

(From the *Scientific American.*)

A LATE number of the London *Mechanics' Magazine* contains a letter from Henry McCormack, M.D., Physician to the Belfast (Ireland) Cholera Hospital, in which he affirms that sulphuric acid is a remedy for cholera. He says: "The elixir of vitriol, which is merely sulphuric acid, diluted with spirit and the addition of a little aromatic, is, as respects cholera, in many cases, the elixir of life. Twenty drops in a little water may be taken every time the bowels are affected, also every two hours for some time afterwards." Dr. McCormack also states that the name of the person who introduced this remedy, like that of many other benefactors of his species, is unknown.

This remedy is now common with our physicians on this side of the Atlantic. The first notice of its efficacy was a recipe given publicly by Dr. Lawrence Reid, of the New York Hospital, during the last visitation of cholera in this city. We suppose he is the *benefactor* who is unknown to Dr. McCormack. The dilute sulphuric acid is given in water sweetened with a little sugar, and is altogether a pleasant drink. Take water six parts by measure, sulphuric acid one part, and mix. Twenty-five drops in water is a dose for an adult, and according to age, from manhood to childhood, subtract a drop for every year. But while sulphuric acid has heretofore been given as a curative only, Dr. McCormack has found it to possess preventive qualities also. He employed it for this purpose at the last outbreak of cholera in Belfast, and with entire success. There is nothing dangerous in the use of elixir vitriol given in such doses as those specified.

THE AMERICAN STEAM FLOATING BATTERY.

(From the *Scientific American.*)

IT appears to us that there never was a greater or more outrageous *take in* perpetrated upon any people or Government, than that of the incipient grumpus battery lying at Hoboken, opposite our venerable Gotham. This monster of the deep was to be built originally for a sum of 586,000 dollars, and be capable of protecting the whole harbour of New York, consigning all its proud forts and batteries to oblivion, as useless man-traps, and at the same time be perfectly competent to sink all the fleets of Christendom, if they dared pop their noses within sight of Sandy Hook, has cost Government 500,000 dollars already, and a Committee appointed to examine it have reported that it will take 812,000,000 dollars to complete the operations begun. This floating battery was commenced in 1842, under a kind of loose understanding with the late R. L. Stevens, who, it is said by his heirs, expended 702,000 dollars upon it; and they now claim 8,671,784 dollars, that being the unexpended sum of the Government appropriations. As it is now fifteen years since this lazy tongs affair was begun, and as science and art relating to marine engineering and floating batteries have undergone a complete revolution in that period, we suppose the work originally done on this intended floating monster is worse than useless. The best thing that could be done with it is to sell it for old iron and timber, or put it in charge of a Committee of "unfinished business," and open it to visitors at the rate of three cents apiece, as a monument of patient labour under liberal appropriations made by that benevolent old gentleman *Uncle Sam.*

THE UCHATIUS STEEL PROCESS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—The above process having attracted a large share of public attention at various times, it is perhaps desirable to state a few facts in reference to it. My brother, Mr. D. Mushet, in the *Mining Journal* of 2nd January, remarks as follows:—"In the spring of this year I was strongly urged by Sir C. Harkort, the proprietor of the fabulously rich iron property in Westphalia, and his friend Mr. Lenz, to examine the specimens of Uchatius steel at Messrs. Kreelt and Co.'s, and also a rail made by the same process, at the office of the Ebbw Vale Company, Laurence Pountney-hill. Mr. Robinson obligingly showed me the rail (on which I made at the time some

remarks in your journal), and explained the particulars of its manufacture. We had some conversation, and I gave my opinion freely respecting the deposit of spathose ore on the Brendon Hills, relied on to furnish the element of the manufacture, but the name of your correspondent, R. Mushet, who has now claimed that rail for his patent, was not so much as mentioned by either of us. Therefore, as the matter stands in your journal of the 19th, all the gentlemen I have named have been passing off on myself and numerous others, a very extraordinary production as having been made by one patent, when it was really made by another. I know more of the Chevalier Harkort than of any of the persons referred to; I am certain any deception on his part is impossible, and am as little disposed to believe in deception by the others: but it is a very serious imputation, which ought to be set right."

On noticing the foregoing remarks, I at once forwarded to the *Mining Journal* office a letter upon the subject, but which was refused insertion. I wrote also to Messrs. Brown, Darby, and Robinson, as follows:—

"Coleford, 5th January, 1858.

"DEAR SIRS,—I have to call your prompt attention to a letter written by my brother, Mr. D. Mushet, which appears in the *Mining Journal* of Saturday last, and in which he states that your firm has passed off upon himself and upon others the rail manufactured under one of my processes (the patent for which was subsequently stifled and suppressed in the hands of your agents, Rixon, Son, and Anton), as a rail manufactured from 'Uchatius steel' under the 'Uchatius process.' What I now require of you is, to insert in the *Mining Journal* a public confirmation of the real facts of the case, namely, that that rail was made under my process and not under that patented by Uchatius.

"I am, yours faithfully,

"ROBERT MUSHET.

"To Messrs. Darby, Brown, and Robinson."

To this letter, copied and forwarded to each gentleman, I received no reply, and in the *Mining Journal* of the 9th instant, no notice appears from any one of these parties. Their silence, then, confirms what my brother has above stated, and the cast steel bridge rail, exhibited at the Ebbw Vale Iron Company's offices in London, and which was made under my patent process No. 9 (subsequently suppressed by Mr. Thomas Brown and his Agents, Rixon, Son, and Anton), must therefore have been palmed upon the public as a cast steel rail, made by Capt. Uchatius's process.

Thus, though I made the steel ingot for Mr. Thomas Brown, under my No. 9 process, and sent it myself to him at Ebbw Vale, to be rolled into the rail in question, and though I hold Mr. Brown's announcement of its having been actually rolled into a first-rate bridge rail, Brunel's pattern, yet when it got into the Ebbw Vale Iron Company's office, in London, it became transmuted into a rail of "Uchatius steel," made under this foreigner's process, and Mr. Robinson, in person, appears actually to have done the honours of the rail to my brother, who went away gulled, like the rest of the public, and proclaimed to the world his having duly inspected this "wonderful production" of the Uchatius process. When, therefore, we see it announced in the newspapers, as it has been from time to time, that the Ebbw Vale Iron Company are about to carry out the "Uchatius process" at their works, we may be able to comprehend the nature of the new manufacture. The "Uchatius process" seems now to consist in substituting the fruit of one man's invention as the produce of another's.

Had the Ebbw Vale Iron Company merely palmed my rail upon the credulous public as a rail of "Uchatius steel" the affair would have been sufficiently dark; but in addition to this they stifled and suppressed my patent under which the rail was manufactured, thus heaping injury upon insult, and consummating their most ungentlemanly conduct, by refusing all apology or explanation of their questionable proceedings.

I hope the world will now be able to understand how to manufacture cast steel by the "Uchatius process."

To show how anxious the Ebbw Vale Iron Company were to obtain a rail for their purpose, I add some extracts from their letters:—

"Ebbw Vale, Sept. 20th, 1856.

"I am most anxious to have an ingot large enough to make a rail, but I fear to venture upon the mixture until your provisional protection is granted.

"I shall be most anxious until your protection is safe; after this I will make it go. Be careful of your health; you have much to carry out. You shall be well backed with influence and capital.

"Faithfully yours,

"THOMAS BROWN.

"P.S. If you want *anything*, let me know. Yours, T. B."

"Watchet, 25th Sept., 1856.

"All I want is, to feel we can define the mixtures and time of operations that will

give us an ingot that will draw out and roll; but at present I feel the article you produce *too* valuable for rails or bar iron.

"Yours faithfully,
"THOMAS BROWN."

"Williton, 26th Sept., 1856.

"I am anxious to have an ingot that will go under Nasmyth's hammer, form a bloom, and then roll the same to a rail or bar.

"THOMAS BROWN."

"At Sirhowy Works,
"Friday, 14th Nov., 1856.

"Mr. Darby and Mr. Roden expressed themselves very much pleased and astonished at your successful mixtures on Wednesday. Mr. Darby confessed to me he was very much absorbed in thought as to the changes *these grand discoveries must lead to;* in fact, he says it is overwhelming for the mind to realize, and requires much coolness. "THOMAS BROWN."

"Ebbw Vale, Dec. 3, 1856.

"I rolled, in the presence of Mr. Darby, No. 3 and No. 7 ingots; they have made the most perfect steel rails imaginable, and he was delighted beyond measure. They were done at one heat after the blooming rolls, 3 grooves, which reduced them to size of rail rolls.

"THOMAS BROWN."

"Ebbw Vale, 25th Dec., 1856.

"I am sorry you have not seen the hammerman to report to you the *first-rate* rail bridge, Brunel pattern, rolled from No. 12 ingot. * * The rail would have been 28 feet long, but for the carelessness of the engineer letting the engine stand, when we had to cut it to 16ft. 6in.—*a first-rate rail.*

"Your faithful Friend,
"THOMAS BROWN."

I am, Gentlemen, yours, &c.,
ROBERT MUSHET.

Coleford, 12th January.

SHIPS' RUDDERS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—It is a standing joke among certain ship-builders, that a famous master shipwright, formerly in H.M.'s service, invariably found the centre of gravity of a ship by dropping a vertical line from the point of intersection of two other lines, drawn respectively from the mizen truck to the heel of the fore-mast, and from the end of the "dolphin-strike" to the taffrail! Now, to adopt this method and to practise it were all very well, perhaps; but to ask your readers to "account" for it would have been going a little too far, I think; and I think the same of the problem which "Nauticus" sets them in your last number. "Nauticus" says, "the fact itself"—that by making a groove up the back of a ship's rudder, you can cure her of a violent shaking about the stern-post—"is well known and indisputable." Now, with all deference to his wisdom and veracity—for if he be the "Nauticus" who wrote on the tonnage question, he has both—I venture to doubt the statement. I know he is not the only person who believes it, for I remember, if I mistake not, that Messrs. Green, of Blackwall, recently administered the groove to one or two of their ships for the purpose mentioned by him. But then I have reasons for distrusting their experience. For example, I believe the same eminent ship-builders are at the present time tapering off their rudders considerably towards the keel, it being to them "a fact," "well-known and indisputable," that ships steer better when the breadth of the rudder is exposed to the broken water at the surface, than when it is exposed to the still water deeper down! But who agrees with them, or can agree with them, in such a theory?

I presume "Nauticus" writes of sailing ships, for he does not mention screw-propellers, and he certainly could not hope to get rid of the thumping which results from the blades of the screw crushing the water at each revolution against the after stern-post, by means of a groove on the back of the rudder. Now, I never heard of any "violent shaking about the stern-post" in the sailing ships of the Royal Navy, and it seems to me that the fact arises from the care with which their rudders are fitted. Let private ship-builders fit theirs as carefully, and they will do a better thing than put a "groove" down their backs.

There is another consideration which makes me distrustful in this matter. I knew a lady who supposed herself dying, and being ordered wine for her health's sake, took the same, and speedily got well again. She constantly alleged that the wine saved her. On inquiry, however, I learnt that she went to a sea-port at about the time she took to the other port, and I naturally concluded that the gallons of sea-air inhaled might have played as important a part in her cure as the glasses of wine imbibed. Now I understand that when the rudder was grooved in Messrs. Green's yard it was also thickened with tapering pieces on the sides, and, for all I know, otherwise modified. Perhaps the steering lines were tightened up a little. How, then, can I believe that the groove did everything?

I am, Gentlemen, yours, &c.,
N. A.

P.S. While I am speaking of ships' rud-

ders I would say that the *Leviathan* appears to me to be questionably fitted in this respect. Her rudder will step in a plate below, and have no other support. She has no pintles or braces. Now I should be afraid that when put hard over, with the ship under way, the force upon the centre of the rudder would be likely to bend or wrench it from its place. Beside, if the ship struck abaft, where would the rudder soon be? N. A.

STONE-PLANING MACHINES.

To the Editors of the Mechanics' Magazine.

Gentlemen,—I have just observed in your magazine, vol. 67, page 590, an inquiry about Hunter's Patent Stone Planing Machines, and have much pleasure in being able to state that they may be seen at work in various places, and are rapidly increasing. There are two at work in Dean Forest, Gloucestershire, two miles from Coleford, where I am at present erecting one of J. and G. Hunter's Patent Stone Cutting (or Sawing) Machines, there being one already at work. I shall be glad to supply Mr. Langans with full particulars of both machines on application.

I am, Gentlemen, yours, &c.,

Geo. Hunter.

Coleford, Jan. 12, 1858.

ARTIFICIAL WHITE LIGHT.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Might not this be obtained with some degree of perfection by causing the ordinary light of a lamp to pass through a series of glasses tinted according to the prismatic spectrum, and agreeing therewith in order. The yellow rays should, of course, be neglected. The only question is, whether or not the recomposition of light can be thus effected; for if this is the case the improvement must be obvious. If true, I do not think that the light would be so enfeebled as to prove an insurmountable obstacle to its use.

I am, Gentlemen, yours, &c.,

J. A. D.

SPECIFIC GRAVITY BALANCE.

To the Editors of the Mechanics' Magazine.

Gentlemen,—If not known, your inserting this may be of use. The specific weight of bodies can be immediately seen by hanging them upon a bent lever balance, where the weight of an equal bulk of water has been marked. The dial should, of course, be graduated, and it is hardly necessary to say that fluids might be tried by means of a vessel holding a given quantity, as the specific gravity bottle.

I am, Gentlemen, yours, &c.,

J. A. D.

MISCELLANEOUS INTELLIGENCE.

The Atlantic Telegraph Company.—The Bill of this Company, to be laid before Parliament, proposes an increase of capital by the creation of new shares and the borrowing on mortgage or bond, the original capital of 350,000*l.* (now all paid up) being found, "in consequence of circumstances beyond the control of the Company," inadequate for the purposes of the undertaking.

Iron Ship-building.—In another part of this Number we have expressed opinions favourable to the extended use of iron in ship-building. Since the article alluded to was written, we have observed the following passage in a lecture delivered at the Royal Engineers' Establishment for Field Instruction, at Chatham, by Mr. H. Conybeare, C.E.:—"You must have observed," he says, "for yourselves, the advantageous results that have attended the substitution of iron for timber and for stone in civil constructions, especially in its application to ship and to bridge building. Iron ships are cheaper, stronger, safer, and far more durable than those of timber. A timber ship of even half the tonnage of the *Leviathan* would be an impossibility (?), but there is no limitation to the size of iron vessels, and all eminent engineers are of opinion that the difficulties, which at present obstruct the application of iron to the construction of ships of war, will be ere long overcome, and that, before the end of the present century, iron will be the only material employed in ship-building."

English Engineering.—During the last twenty years nearly five hundred millions have been expended in England alone on civil engineering undertakings.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Belshaw, J. *Improvements in manufacturing knit fabrics.* Dated Apr. 25, 1857. (No. 1177.)

Here two or more extra threads for producing pile are sunk by two sinking wheels between the needles, the sinkers on one wheel sinking its thread between the alternate needles of the machine, and the sinkers of the other wheel sinking its thread in

those spaces between the needles which are missed by the first-mentioned sinking wheel, and so on alternately, if more than two extra threads be used.

COWPER, C. *Improvements in electro-plating and depositing metals.* (A communication.) Dated Apr. 27, 1857. (No. 1180.)

This consists in the application in electro-plating and depositing metals of solutions of gold and silver and other metals, prepared by adding tartaric acid to a double cyanide of potassium and the required metal, and submitting the mixture to pressure, by closing the vessel containing it, or otherwise.

KEYSER, P. DE. *An apparatus for preventing horses slipping.* (A communication.) Dated Apr. 27, 1857. (No. 1181.)

This consists of a piece of iron, about a ¼in. thick, turned up at each end to form two arms projecting upwards, one arm about ½in., the other a little more, the said arms forming a groove of sufficient width to form a portion of the rim, or flukes, or ends of a horse's shoe. An opening is formed in the piece of iron, in the centre of the groove thus formed, in order that a pointed piece of iron or steel may be affixed to give foot-hold on the ground to the horse.

BARNES, E. F. *Improvements in telegraphic instruments, and called an "embossing telegraph."* Dated Apr. 27, 1857. (No. 1183.)

This invention cannot be described without engravings.

FONTAINEMOREAU, P. A. L. DE. *Improvements in obtaining motive power.* (A communication.) Dated Apr. 27, 1857. (No. 1184.)

This consists in an arrangement of treadles which, when actuated by the feet of men, put in motion a fly wheel and pulley, thereby producing motive power which may be transmitted to machinery.

MACINTOSH, J. *An improvement in the manufacture of air-beds, cushions, and other like inflated and fluid-tight apparatus or bags.* Dated Apr. 27, 1857. (No. 1185.)

This consists in applying in such manufactures india-rubber bags or vessels inserted within, and protected by, tubular or hollow knit fabrics.

EDDINGTON, A. *Improvements in machinery for ploughing, tilling, and draining land.* Dated Apr. 27, 1857. (No. 1186.)

Here two barrel or drum carriages are used, each carrying a portable steam engine, one to each headland, and the ploughs or other implements are drawn simultaneously in parallel lines to and from the two barrels or drums, by which arrangement, the portable engine and the drum or barrel carriage, though independent when out of use, are so constructed that when in use they are coupled together, and by moving the one along a headland, the other is moved at the same time.

ROTCH, T. D. *Certain new and useful improvements in gas generators.* (A communication.) Dated Apr. 27, 1857. (No. 1187.)

This invention enables the patentee to fully decompose all the coal in the retort into gas and aqueous products, and this by not only reversing the position of the outlet for the gas, but by adapting the size of such outlet to the kind of coal to be decomposed.

LEVESLEY, W. *Improvements in manufacturing the blanks of forks, scissors, cutlery, chisels, and other tools; which improvements are applicable to the manufacture of springs for pocket-knives and other like articles now prepared by the forging process.* Dated Apr. 27, 1857. (No. 1188.)

This relates to the adaptation, under certain modifications, of the patentee's process for manufacturing knife blades, patented 12th July, 1853, to the manufacture of blanks for other articles of cutlery.

BILLIARD, J. *Improvements in the arrangements and construction of furnaces and other fire-places.* (A communication.) Dated Apr. 27, 1857. (No. 1189.)

This relates to the construction of furnaces, &c., for the supply of fuel thereto, whereby the distillation of the fuel is effected before it reaches the fire-grate, and the combustion of the gases evolved afterwards effected.

HOCHSTAETTER, H. *Improvements in the manufacture of matches.* Dated Apr. 28, 1857. (No. 1190.)

Matches which contain no poisonous matter, and are not injurious to the workmen, are made by dipping the ends in an igniting composition made by combining chloride of potash, chromate of potash, binoxide of lead, red sulphate of antimony, or sulphur of antimony, or any other metallic sulphur, gum, or starch, pumice stone or manganese, flower of sulphur, or milk of sulphur. The addition of chlorite of lead causes the matches to ignite more readily.

AGER, W. *An improved mode of hulling and cleaning rice.* Dated Apr. 28, 1857. (No. 1192.)

This consists in effecting the hulling by a shell and burr rotating in opposite directions, and so dressed and constructed that the grain shall be turned at right angles to

the axis of the said shell and burr on coming between them, and each burr be made to receive a pressure in direction of its length sufficient to separate the husk. And, further, in passing the rice and husk between a shell and burr rotating in opposite directions, and so dressed that the husk shall act upon and remove the inner coating before mentioned, and the germ be also separated from the grain during the cleansing operation.

GILBEE, W. A. *An improved mode of reefing and reducing top-sails.* (A communication.) Dated Apr. 28, 1857. (No. 1195.)

This consists, 1, in running lines from the reef between the head of the topsail and the fore part of the yard, and direct up to the head of the top mast; 2, in arranging the reef tackle beneath the yard to run from the end of the yard to the quarter-deck: 3, in a mode of strengthening the sails by bands and double ropes.

RAMSBOTTOM, J., and J. BAILEY. *Improvements in regulating the flow and pressure of liquids and fluids.* Dated Apr. 28, 1857. (No. 1198.)

This invention consists of apparatus for regulating the supply of fluids in small quantities to the bearings of machinery. The mode of actuating the apparatus for lubricating shafting, so that a deposit of the lubricating matter shall be effected in certain intervals of time, is by employing a reducing motion consisting of discs or wheels, so arranged as to impart motion from the shafting to the regulating valve in a slow or reduced manner. A simple plug containing a recess may also be used for lubricating purposes with the improved reducing motion. Or, when the lubricating matter is to be discharged against pressure, as within the cylinder of a steam engine, a hollow plug is used with two orifices leading to its interior, with a space between them, one to let in the lubricating matter from the top, and the other to allow its discharge within the cylinder when reversed. The improvements for regulating pressure are to render regulating valves more susceptible to very slight differences, by hanging them so as to avoid friction. Two such valves being hung by two balls and a connecting rod, are suspended by a cylindrical block rounded at the end, to which a diaphragm is attached with freedom to vibrate between the rounded surfaces circumscribing it. The flow and pressure are regulated by the ascent and descent of the block and valves.

CHADWICK, D., and H. FROST. *Improvements in apparatus for measuring water and other liquids and gas, applicable also to the purpose of obtaining motive power.* Dated Apr. 28, 1857. (No. 1200.)

This invention was fully described and illustrated at p. 577 of No. 1793, Vol. 67.

PASCALL, C. *Improvements in tile making machinery.* Dated Apr. 29, 1857. (No. 1202.)

This relates to shaping the ends of tiles, and cutting them off, when produced in lengths from the squeezing box. The patentee effects this by means of two wires, stretched between two slides, which traverse across the breadth of the tile in guides which cause the wires to traverse in curves or lines, and cut the tile of the proper length, and with the ends of the form required.

BOTTOMLEY, J., C. HODSON, and W. FIELDEN. *Improvements in mules for spinning.* Dated Apr. 29, 1857. (No. 1208.)

This relates to governing the motion of the carriage of hand and other mules, so as to gain a varying motion thereof. The patentees employ a conical pulley, to which one end of the band is attached, the other being connected to the carriage.

JOHNSON, J. H. *Improvements in apparatus for distilling, applicable also to the extraction of oils, colouring matters, and essences, and to the purification of gums.* (A communication.) Dated Apr. 29, 1857. (No. 1210.)

This relates to distillatory apparatus, and to a mode of applying the same to the extraction of oil from oleaginous grain or seeds, the extraction or preparation of colouring matters from the substances containing them, the obtainment of the aromatic principles from plants, the various purposes of ordinary distillation, as in the production of ardent spirits, and to the purification of gums, resins, &c. Illustrations are requisite for an intelligible description of the apparatus employed.

WALTON, F. *Certain improvements in the manufacture of plastic compositions.* Dated Apr. 30, 1857. (No. 1211.)

This consists in rendering the composition patented 20th Jan., 1857, less sensitive to the action of heat. The composition is subjected to the action of heat in an oven, whereby certain gases are evolved, and the composition is rendered capable of resisting greater heat than heretofore.

WALTON, F. *Improvements in the manufacture of wire cards for metallic brushes, and for carding fibrous substances, and in the machinery employed therein.* Dated Apr. 30, 1857. (No. 1212.)

This invention cannot be described without engravings.

SPOONER, L. H. *A new or improved manufacture of paper and paper pulp.* Dated Apr. 30, 1857. (No. 1214.)

The patentee claims the manufacture of

paper and paper pulp from the plants called zostera, otherwise called wrack grass, or wreck grass, whether their fibres be used alone, or in combination with other vegetable fibre.

BARCROFT, B. *Improvements in dyeing and printing.* Dated Apr. 30, 1857. (No. 1215.)

The object here is the production of a chemical mixture to be used in dyeing and printing, by mixing sulphuric acid and water with solutions of chloride of ammonium, of white arsenic, and of oxymurate of tin.

BALDWIN, T. *Improvements in indicators for registering pressure.* Dated Apr. 30, 1857. (No. 1216.)

This relates, 1st, to the recording of the effective pressure of the steam acting expansively or otherwise in the interior of the cylinders of steam engines, during the times the velocity of the engine is constant, but when the velocity varies the action of the governor of the indicator upon the measuring apparatus is such as to cause it to measure a proportionally greater pressure when the velocity increases, and a proportionally less pressure when the velocity decreases than the true pressure which is measured when the engine has a constant velocity. The sum of these pressures being multiplied by the constant velocity, will give the force exerted by the engine during the time it has been in motion. 2d, to the registering of pressure, by substituting in the place of springs a vessel containing mercury, into which is placed a float specifically lighter than mercury.

MORTIMER, S. *Improvements in "screw gill-boxes" used in the preparation of wool and other fibrous substances.* Dated Apr. 30, 1857. (No. 1218.)

This relates to retarding the drop of the fallers in screw gill-boxes from the upper bed or saddle to the lower one, so that when one of the fallers leaves, or is driven off the upper bed or saddle, it is received and supported by the sliding pieces and springs or levers, yet allowing the cams to press or force the faller gradually down to the lower bed or saddle, thus avoiding or preventing sudden concussion; and when the said faller is removed, the springs or weighted levers force up the sliding pieces ready at the proper time to receive the next faller.

NEWTON, W. E. *Improved machinery for moulding and pressing bricks.* (A communication.) Dated Apr. 30, 1857. (No. 1219.)

This invention cannot be described without engravings.

CAMMELL, C. *Improvements in the manufacture of axles or axle-trees for railway carriages and shafts for various purposes.* Dated Apr. 30, 1857. (No. 1220.)

The patentee encloses a core of malleable iron within a covering of steel. One method (when making shafts of several inches in diameter) consists in combining cast-steel with a number of wrought-iron tubes, arranged concentrically one within the other in a mould, leaving annular spaces between the tubes, which spaces will be filled with the cast metal, an outer covering of steel being made to enclose the outermost tube.

POWERS, G. *An improved scuttle for ships.* Dated Apr. 30, 1857. (No. 1221.)

This invention was described and illustrated at p. 277, of No. 1780, Vol. 67.

COLLINS, J. *Improvements in furnaces and flues, and in kilns and drying-chambers.* Dated Apr. 30, 1857. (No. 1225.)

This consists, 1st, in making the bars of furnaces of fire-brick, and in constructing the bottoms of furnaces of perforated slabs of fire-brick supported on iron bars or plates; 2d, in placing toothed bridges in the flues of steam-boilers, salt-pans, &c. Also, in the use of diaphragms placed in flues, for inducing a more perfect combustion of the volatile products evolved from the furnace. 3d, in constructing the heating apparatus of kilns and drying-chambers of such a form as to induce a very perfect combustion of the fuel, the said apparatus being applied to the heating of the exterior or interior of a series of tubes whereby currents of atmospheric air are distributed over and through the said heated tubes. The air thus heated may be discharged alone, or in combination with the products of combustion, into the kilns or drying-chambers. The patentee employs perforated zinc plates placed on wood or metal bearings to receive the matters to be dried.

ANDERSON, J. *Improvements in the treatment, application, and use of maize or Indian corn.* Dated Apr. 30, 1857. (No. 1226.)

Here the grains of the corn are first steeped in water, and after removal from the steep are subjected to frictional pressure. This loosens the embryo from the perisperm or albumen. The perisperm or albumen is then removed from the embryo, and the perisperm or albumen alone is then operated upon according to the usual starch-convertive process. The embryo contains the oil, and this is then subjected by itself to the usual process of expression.

HAWKES, E. *New or improved machinery for the manufacture of pipes for smoking.* Dated May 1, 1857. (No. 1229.)

This comprises machinery by which sheets of clay are rolled for producing blanks or

rolls for pipes, when transversely divided, the said transverse divisions being effected by a roller and plate. Also, the completing of the formation of the pipes from the blanks or rolls by the said machinery.

JOHNSON, J. H. *Improvements in apparatus for preventing collisions at sea.* (A communication.) Dated May 1, 1857. (No. 1231.)

This consists of a whistle similar to those employed in locomotive engines; but its pipe is inserted into a compressed air-chamber.

BLANDY, A. A. *An improved mode of moulding and casting the plates or bases of artificial teeth.* Dated May 1, 1857. (No. 1232.)

This consists, 1st, in a process by means of which an absolute fit of the plate to the mouth is obtained; 2d, in so forming the roots of the tooth, as to adapt it to the process of casting, so that a firm retention of the plate to the tooth is obtained by the simple act of casting the plate; 3d, in the use of a matrix, which, when exposed to the action of heat at a given temperature, will neither shrink nor expand, thus removing the possibility of the plate, when cast, being either too large or too small; 4th, in casting the plates or bases of an alloyed metal, which, after being cast, will not shrink or expand on solidifying or cooling.

LEAKE, R., and M. SYKES. *Improvements in consuming smoke and generating heat in furnaces of steam-engine or other boilers; also, heating the feed-water of the said boilers, therefore economizing fuel to a great extent.* Dated May 1, 1857. (No. 1233.)

This consists in separating the ash-pit into two parts, by building a wall up the centre thereof, and providing the same in front with two doors. Also, in the use of hollow dead plates, divided as above stated, and grate bars through which air passes to the split-bridge of the furnace, and in the use of a series of fire-clay pipes, placed either before or behind the split-bridge, for separating the smoke into small particles, so as to be easily acted upon by the flame from the fire. The patentees employ a "tue iron" and blower to each of the aforesaid pipes. It further consists in adapting a water tank extending the whole length and width of the fire-grate, and in constructing the fire-box of wrought iron, to save the expense of a door-frame and fire-arch.

TUCKER, E. *Improvements in the manufacture of starch.* Dated May 2, 1857. (No. 1235.)

This relates, 1st, to the production of starch from wheat, barley, rice, and all other kinds of grain, except maize or Indian corn, by primarily steeping the uncrushed grain in water heated to about 200° of Fah. The starch and slimes are next separated from the reduced mass in the usual way; 2nd, to the production of starch from maize or Indian corn in a whole or unreduced condition. Here the grain is primarily subjected to the action of steam, or is steeped in water heated to about 140° to 200° of Fah. The final starch convertive process is then pursued in the ordinary manner.

LEVY, H. *Improvements in moleskins, velveteens, cords, and such like materials.* Dated May 2, 1857. (No. 1238.)

This consists in weaving a woollen facing back or lining with velveteens, cords, &c., which will operate as a non-conductor to repel excessive heat or cold.

PATERSON, A. J. *An improved method of constructing and propelling vessels.* Dated May 2, 1857. (No. 1240.)

This invention consists in constructing vessels with hollow, pointed, or conical drums, of about the same sectional area at their broadest parts as that of the vessels themselves, to form the bow and stern, and with screw blades upon the outer surfaces thereof. These hollow screw drums being made to rotate will propel the vessel.

DAVY, J., and W. BENTLEY. *Certain improvements in looms for weaving fibrous substances.* Dated May 2, 1857. (No. 1241.)

This consists in adapting to looms certain mechanism for operating upon a system of shuttle-boxes connected together (somewhat similar to the links of a flat chain), working around hexagonal or other flat-sided rotating pieces of wood or metal, the axes whereof are in the direction of the length of such said pieces, the width of the aforesaid flat-sides being somewhat more than the width of the shuttle-boxes, which are successively brought into contact therewith, and advanced thereby as they rotate.

GREENHOW, J. S. *An improvement in alarum apparatus when using electric currents.* Dated May 2, 1857. (No. 1242.)

This consists in so arranging the electric circuit and battery that there is a constant flow of electricity from pole to pole of the battery, so that an electro-magnet in the circuit may attract its armature constantly, and retain the alarum from being sounded; and the patentee arranges the parts of the circuit in connexion with doors, windows, and other places, so as to compose a complete circuit when all are closed, and so that the alarum will be sounded on breaking the circuit, however that may be done. And he combines therewith clockwork apparatus, to prevent the sounding of the

alarum during the hours it is desired that the electric apparatus shall not be required to act.

CAUVILLE, A. L. *Improvements in the manufacture of shoes and boots.* Dated May 2, 1857. (No. 1243.)

This consists in forming the soles of pieces of ingrooved wood, jointed together with a flexible material, the wooden sole being afterwards covered with a leather or gutta-percha sole.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

LARCHIER, A. V. F. *Improvements in the manufacture of gas.* (A communication.) Dated Apr. 27, 1857. (No. 1179.)

Here the inventor manufactures gas from the refuse produced in the manufacture of cotton, wool, &c., by distilling this refuse in retorts, as coal gas is manufactured, but at a lower temperature.

THOMPSON, W. and H. WOODS. *Improvements in lowering weights by means of cranes, winches, or similar apparatus.* Dated Apr. 27, 1857. (No. 1182.)

This consists in the application to the lowering of weights on the principle of regulating the resistance of atmospheric air, by regulating the exit of air from a vessel attached to a crane, or winch.

WITHNALL, J. *Certain improvements in the manufacture of rollers or cylinders to be employed for printing calico and other surfaces.* Dated Apr. 28, 1857. (No. 1191.)

This relates to the manufacture of rollers composed of two cylinders, one within the other, and consists in forming the inner roller of "homogeneous metal."

BARKER, J. *An improved propeller for ships and vessels.* Dated Apr. 28, 1857. (No. 1193.)

This consists of a float made to travel to and fro in a case, and to feather in its return stroke. The float is centered upon the end of a shaft, and has connected to it a guide pulley, which works in grooves in a case, springs being sometimes employed to assist in feathering.

SUTHERLAND, K. L. *An improved safety candle lantern.* Dated Apr. 28, 1857. (No. 1194.)

This consists in constructing a safety candle lantern, particularly suited for ships' purposes. The lower part of the lantern is a metal cylinder, with a socket for the candle holder, which contains a coiled spring and cap to keep the candle in. A wire rises upwards, whereby to take out the candle holder when required. From the metal cylinder there rise metal rods, which support a flat metal ring, and between two of these rods there is a plate, which acts as a reflector, and outside is a plate which carries a pair of handles. The top of the plate has a loop for hanging the lantern. A ledge is soldered at the upper part of the metal cylinder inside, to receive a glass cylinder chimney. There is also fitted a hinged top, which on being closed keeps the glass in position. The cover may be locked or closed by a screw. Apertures for air are formed in the metal cylinder.

GRUNDY, D. *Improvements in the manufacture of boots, shoes, and clogs.* Dated Apr. 28, 1857. (No. 1196.)

The inventor makes the soles in two parts, the heel and shank of wood and gutta-percha, and the sole of leather and gutta-percha, and he unites the two parts at the shank with nails or rivets, and, if desired, fixes a spring longitudinally to yield to the spring of the foot. He also attaches to a wooden heel and the soles of clogs a piece of india-rubber, and covers the same with leather or gutta-percha, to prevent the noise which proceeds from wood alone.

JONES, W., and T. EDWARDS. *An improved lubricator.* Dated Apr. 28, 1857. (No. 1197.)

This consists in employing a vessel having a tube leading to the part to be lubricated. Within the vessel at the upper part of the tube is a trough, leading to the tube. Above the tube is a pulley to which rotary motion is given, and which is furnished with feeders, which, as the pulley revolves, is lifted in and out of the vessel, depositing the oil into the trough, the oil afterwards passing through the tube leading to the part to be lubricated.

NEWTON, G. *Improvements in copying and other presses.* Dated Apr. 28, 1857. (No. 1199.)

This refers principally to the screw-presses usually fixed on a stand; here the press is placed underneath, with the screw downwards, to press upwards, thus leaving the stand free to be used as a table.

REED, J. H. *Improvements in propelling ships or vessels.* Dated Apr. 29, 1857. (No. 1201.)

Here "the principle of the screw propeller is applied to paddle-wheels"—that is to say, the floats are arranged in the form of a helix, in place of being parallel to the axis of the wheel.

AITKEN, J. *An improvement in furnaces for melting the materials of glass, iron, and other metals, and for boiling water and other substances.* Dated Apr. 29, 1857. (No. 1203.)

Fire bars run along or across the furnace, with an entrance outside. To keep the

fumes of the fire from the materials, there is on each side of the fire-bars a thin partition extending from the bottom to a flue in the top of the furnace. The flue is to wind round the furnace chamber in the wall, and to be connected with a fan or air pump outside of the furnace.

HOW, A. P. *An improved cork-holder for bottles and other vessels.* Dated Apr. 29, 1857. (No. 1204.)

This consists of a ring of metal which surrounds the neck of the bottle, and has attached to it a loop of the same metal, which passes over the top of the cork.

CURTIS, W. J. *Improvements in apparatus to facilitate passengers ascending to and descending from the roofs of omnibuses.* Dated Apr. 29, 1857. (No. 1205.)

Here a ladder is applied to the back of an omnibus so that it may, when out of use, be attached to the back of the omnibus in an upright position, the lower end being off the ground; but when about to be used the ladder is inclined, when the lower end comes to the ground.

BUSQUET, A. A. B. *Certain improvements in artificial flowers.* Dated Apr. 29, 1857. (No. 1206.)

This consists in using oil paint for the manufacture of artificial foliage and flowers. Having stretched out the fabric for leaf work, for instance, the inventor gives it a preliminary coat of oil paint to form the ground of the leaf. He afterwards produces the contour and form, and then, by the hand or otherwise, the tint or colour peculiar to the leaf required.

MENUSIER, F. *An improved bee-hive.* Dated Apr. 29, 1857. (No. 1207.)

This consists of an oblong box divided into two compartments, the upper for the new swarm, and the lower for the breeding hive. Each compartment contains a number of frames to receive and support the honeycomb. In the interior at the end of the hive is an opening to allow the bees to pass from one compartment to the other. Each compartment has an entrance for the bees at one of the extremities of the hive. There are two openings covered with metallic gauze, for the ventilation of the hive.

BARTHOLOMEW, G. *Improvements in tanners and curriers' knives.* Dated Apr. 29, 1857. (No. 1209.)

Each knife is formed of two cutting blades, set back to back, a little distance apart, in a clipping frame. This frame consists of two flat parallel plates of metal, welded together at the ends, space being left between them to receive the two cutting edge pieces. When the cutting edge pieces are inserted in their places the handle of the knife is made to clip them, and hold them firmly by a central row of taper rivets. When the cutting edges are worn down the rivets are easily knocked out, and the cutting edge pieces removed, and fixed in a smaller holder, and so on until entirely worn out.

BALL, H. *Improvements in repeating and other fire-arms.* Dated Apr. 30, 1857. (No. 1213.)

This consists in constructing revolver fire-arms with single and double action locks of several kinds; also a method of connecting the barrel and lock frame; also, a screwbolt that holds them together; also, in a self-acting safety-stop for the prevention of accidental discharge; also, in a compound self-acting spring stop or bolt for stopping and bolting the revolver; also, in a lever loading rod, with sliding rammer and catch for the same; and, lastly, in the construction of a fire-arm designed for defensive purposes.

MCDOWALL, J. *Improvements in steam hammers.* Dated Apr. 30, 1857. (No. 1217.)

Here a hammer block is raised by admitting steam to a cylinder upon the upper side of a piston, which is thereby forced downwards, and carries with it a belt or chain which is attached to a segmentally-ended lever connected to the hammer block. The hammer descends by its own gravity, the force of the blow being regulated by the velocity with which the steam is allowed to escape from the cylinder.

HALE, T. F. *An improved tap or cock.* Dated Apr. 30, 1857. (No. 1222.)

This invention was described and illustrated at p. 465 of vol. 66.

LEWIS, S. R. *Improvements in trowsers.* Dated Apr. 30, 1857. (No. 1223.)

This consists, 1st, in attaching to the waist-band of trowsers, at the back and front, pieces of elastic material, to which hooks are connected, over which hooks the button-holes of the braces are passed, each piece of elastic material being so folded as to allow of expansion in various directions. 2d, in the insertion of a piece of elastic material in the seat and back seam, so as to allow the seam to open by lateral expansion when stooping.

AVERY, J. *An improved washing or fulling machine.* (A communication.) Dated May 1, 1857. (No. 1227.)

This invention cannot be described without engravings.

BARTEAU, P. A., G. GUY, and C. CORROY. *Improvements in the production of artificial stone.* Dated May 1, 1857. (No. 1228.)

This consists in the production of artificial stone from iron slab, bricks, rubble,

&c., broken in pieces, and cemented together by a mixture composed, in certain proportions, of hydraulic lime, Roman cement, iron oxide, or iron filings, and rough broken plaster, mixed dry, and then worked up with water to the consistency of mortar, then put into moulds with the broken materials, so that they shall become bound by the cement when dry. The facing of the casting is effected by a wooden blade.

RATCLIFFE, J. *Improvements in preparing, or in machinery for preparing, yarns or threads for weaving.* Dated May 1, 1857. (No. 1230.)

This consists in subjecting yarns or threads which have been sized and dried to the action of a brush, or of brushes, or their equivalents.

HILTON, S. *Certain improvements in furnaces.* Dated May 2, 1857. (No. 1234.)

This consists in introducing a hollow chamber or deflector into the furnace above the bars, and at a suitable distance between the front or dead plate and the ordinary bridge or back end of the furnace bars. It should be of such a size and so situated as to check the direct passage of the flames and products of combustion given off from the green coal or fuel on the front part of the furnace bars, and deflect them over the incandescent fuel.

HELY, A. A. DE R. *Certain improvements applicable in the burning of gas.* Dated May 2, 1857. (No. 1236.)

The object here is to diminish the injurious effects produced in the burning of gas. The upper orifice of a common gas glass shade or chimney is stopped with a hollow lid of heat-resisting material, closed at the top and sides, but ventilated at the bottom, where it projects at one or more places beyond the said orifice by apertures.

JONES, P. R. *An improved composition for the purpose of curing or preventing the scab in sheep and lambs, which will also greatly promote the growth of the wool, and destroy ticks, lice, and other vermin or impurities, keep the skin clean and healthy, and cure the mange in horses, dogs, and other animals.* Dated May 2, 1857. (No. 1237.)

The composition is as follows:—To one gallon of boiling water are added twenty-four ounces of marsh mallow roots and leaves, and when cold, are added eight ounces of sulphuric acid. The mixture is to be applied outwardly.

CHATEL, G. *Improvements in the manufacture of blinds, screens, reflectors, and other articles of a similar nature.* Dated May 2, 1857. (No. 1239.)

This consists in cutting out of the fabric which is to form the ground of the blinds, screens, &c., forms corresponding to the designs required. Then in glueing on the cut out forms pieces of differently coloured stuffs, so as to hide and ornament the joints of the different parts. The inventor prints on these joint designs with a mordant, which he sprinkles with velvet powder or shearings, which gives them the appearance of velvet.

PROVISIONAL PROTECTIONS.

Dated September 18, 1857.

2428. George Edward Dering, of Lockleys, Hertford. Improvements in laying down electric telegraph cables, in obtaining soundings, and in ascertaining the position of and raising submerged electric telegraph cables and other bodies.

Dated November 30, 1857.

2980. Jean Baptiste Couy, of Nantes, ship-owner. Improvements in the manufacture of manure, and for the disinfection of animal and vegetable matters.

Dated December 9, 1857.

3045. Charles Westendarp, Jun., agent, of Mincing-lane. Preparing a material as a substitute for ivory, which he proposes calling "artificial ivory."

Dated December 17, 1857.

3095. Montague John Turner and Marcus William Turner, of Woodcote, Surrey, Esquires. The improvement of conduit pipes and tubes for sewers, drains, conduits, gas, and other purposes.

3096. Francis Mollett Blyth, of Norwich. An improved apparatus for cutting and pulping turnips and other roots.

3097. William Blizzard, of Notting-hill. Improvements in the treatment of india-rubber by a new process for the manufacture of a chrystaline and colourless varnish for waterproofing all kinds of textile fabrics and papers without smell, and without in any degree altering their appearance, and for making divers varnishes and paints.

3099. Mark Mason, of Dukinfield, Chester, machine-maker, and Thomas Markland, of Newton, near Hyde, warp-dresser. Improvements in machinery or apparatus for printing.

3101. Edward Highton, of Regent's Park, civil engineer. Improvements in electric telegraphs.

3105. John Henry Johnson, of Lincoln's-inn-fields. Improvements in lubricating the journals of shafts and spindles. A communication from S. Péchet, of Paris.

Dated December 18, 1857.

3107. Joseph Bennett Howell and John Shortridge, of Sheffield. An improved mode of rolling steel for springs.

3109. David Bowlas, of Reddish, Lancaster, cotton-spinner. Improvements in machinery or apparatus for preparing and spinning cotton and other fibrous substances.

3113. James Murdoch Napier, of Lambeth, engineer. Improvements in letter-press printing-machines.

Dated December 19, 1857.

3115. Thomas Newey, John Corbett, and William Henry Parkes, of Birmingham, manufacturers. A new or improved method of treating or coating steel pens and penholders, to prevent the oxidation of the same, which method of treating or coating

may also be applied to other articles of iron and steel.

3119. William Walker, of Leeds, maltster. An improved apparatus for the purposes of heating and drying.

3121. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., patent-agent. Improvements in lime kilns, and in apparatuses employed for working the same. A communication from A. C. Simoneau.

3123. Thomas Coles, of Bristol, mechanic. An improvement in chaff-cutters.

3124. William Bough, of Jewin-crescent. Improvements in lamps and wicks for burning rosin and other oils and fluids, parts of which improvements are applicable to argand gas-burners.

3125. Robert Mushet, of Coleford, metallurgist. Improvements in the manufacture of iron.

Dated December 21, 1857.

3129. William John Kendall, of Norwich. An improved safety signal for railways.

3131. Francis Taylor, of Romsey. Improvements in closets or privies.

3132. George Tomlinson Bousfield, of Loughborough Park, Brixton. Improvements in machinery used in the manufacture of springs, and in the application of springs to carriages. A communication.

3133. William Henry Myers, of Whitechapel-road, printer. An improved coffee-pot, made of metal or earthenware, to contain coffee and milk or cream separately, the same being used as a chocolate-pot, the same invention being applicable to teapots, for the same purposes, made either in metal or earthenware, the same invention being applicable to table urns, and the same invention being applicable to jugs, made either in earthenware, or glass, or metal, to contain spirits and water or other liquids in different compartments.

3135. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., Patent Agent. Improvements in breech-loading fire-arms. A communication.

3137. Alphonse René le Mire de Normandy, of Judd-street, Brunswick-square, analytical chemist. Improvements in apparatus used for distilling sea water on board ships and vessels.

Dated December 22, 1857.

3139. Arthur Challis Kennard, of the Falkirk Iron Works, N.B. Improvements in trussed iron bridges. A communication.

3141. John Henry Johnson, of Lincoln's-inn-fields. An improved signal apparatus to be attached to common road carriages. A communication from L. F. Bréguet, of Paris.

3143. Orlando Greenhalgh, of Horwich, Lancaster, Manager, and Robert Hutchison, of the same place, mechanic. Improvements in apparatus for stirring and mixing colours for calico printing and other purposes.

3145. George Bridge, of Bollington, Chester, Manager, and Job Hamer, of Longsight, near Manchester, mercantile clerk. A new process or manufacture for converting woven silken fabrics or silk waste into a fibrous material fit for being spun into yarn or thread, or for being mixed with silk, woollen, cotton, or any other material to be spun into yarn or thread, and of improvements in machinery to be employed in such process or manufacture.

Dated December 23, 1857.

3146. Daniel Jones Crossley, of Hebden Bridge, York, manufacturer. Improvements in the manufacture of certain textile fabrics, called Pellones, and used for saddle covers, and in the machinery or apparatus employed therein, which improvements are also applicable for weaving other fabrics.

3147. Thomas Landi, of Paris, and Charles Falconieri, of Charles-street, Middlesex Hospital, civil engineer. Improvements for laying subaqueous electrical cables for telegraphic communications.

3149. Christopher Nugent Nixon, of Ramsgate, gentleman. Improvements in attaching, fitting, and securing the rudders of ships, barges, boats, and every other description of sailing or steam vessels.

3151. Joshua Moss, Thomas Gamble, and Joseph Gamble, all of Sheffield, steel manufacturers. An improvement in the manufacture of cast steel hoops and cylinders.

3153. Charles Norton, of Camden Town. Carriage door shields, to prevent accidents arising from the shutting of railway or other carriage doors, also applicable for nursery doors or any other doors where children may have access, or where safety from accident may be an object.

Dated December 24, 1857.

3155. George White, of Lawrence Pountney-lane, Cannon-street. A semeo-melodion or instrument for demonstrating musical writing. A communication from A. Früh, of Vienna.

3156. Charles Reeves, of Birmingham, manufacturer. Improvements in repeating or revolving fire arms.

3157. Samuel Henry Adderley, of Birmingham, manufacturer. Improvements in the manufacture and ornamentation of pencil cases, penholders, reserves or cases for leads, needle-cases, and ink-holders, and other tubular cases.

3158. Thomas Playle, of Chatham, coach builder. Improvements in two-wheeled carriages.

3159. George Croft, of Keighley, mechanic, and Smith David Steel, of Keighley, manager. Improvements in machinery or apparatus for combing and preparing wool and other fibrous substances.

3161. George Burley, of King Cross-road, near Halifax, York, mechanic. Improvements in apparatus for cutting the pile of fustians and other pile fabrics.

3162. Henry Charles Fenwick Wilson and Thomas Green, both of Dunston, Durham. A machine or apparatus for making rivets.

3163. Henry Charles Fenwick Wilson and Thomas Green, both of Dunston, Durham. Improved machinery or apparatus for making rivets.

3164. Benjamin Burleigh, of Great George-street, Westminster, and Frederick Ludwig Danchell, of Oxford-street. Certain improvements in the manufacture of vessels, plates, or utensils, used for domestic, sanitory, electric, and manufacturing purposes.

Dated December 26, 1857.

3165. Alexander Chaplin, of Glasgow, engineer. Improvements in steam engines, and in the combustion of fuel.

3166. Antonio Ribeiro Saraiva, of Portugal, gentleman. An improved candlestick or holder.

3167. Charles Frederick Parsons, of Duke-street, Finsbury, engineer. Cleansing and reburning animal charcoal.

Dated December 28, 1857.

3168. Alexander Bruce, of Manchester, watch maker. Improvements in watches and timepieces.

3169. John Barling, of Halifax, York. An improved paddle for propulsion on water.

3170. John Henry Johnson, of Lincoln's-inn-fields. Improvements in the treatment and preservation of skins, furs, wool, and textile fabrics, and in the machinery or apparatus employed therein. A communication from Madame Prost.

3171. Henry Deacon, of Widnes, alkali manufacturer. Improvements in purifying alkaline lees.

3172. James Boydell, of Gloucester-crescent, Camden Town. Improvements in carriages propelled by steam or other power.

3173. James Wadsworth, of Hazelgrove, near Stockport, machine maker. Improvements in the

production and management of artificial light, and in apparatus applicable thereto.

3176. John Thomas Griffiths, of New Basford, Nottingham, lace manufacturer. Improvements in the manufacture and ornamenting of lace.

3177. Isaac Holden, of St. Denis, Paris. Improvements in preparing and combing wool and other fibres.

Dated December 29, 1857.

3178. Thomas Spencer, chemist, of Euston-road. Improvements in the purification of illuminating or lighting gas.

3179. Henry Thomson, of Liverpool, manufacturing chemist. Improvements in the application or use of a certain substance as a substitute for glue, paste, cement, varnish, and other similar compounds.

3180. John and Joseph Hargreaves, of Liverpool, watch manufacturers. Improvements in winding up watches which have not fusees or chains.

3181. Alexander Parkes, of Birmingham. Improvements in joining or uniting metals.

3182. Victor Mourot, of Paris, merchant. Improvements in furnaces for heating kilns and ovens used in the manufacture of pottery and earthenware, part of which improvements are also applicable to furnaces generally.

3183. Edwin Gomez and William Mills, of New York. An improved composition for trains or safety fusees, and similar purposes.

Dated December 30, 1857.

3185. Frederick Oldfield Ward, of Cork-street, Burlington-gardens. Improvements in liberating or producing potash or soda, or both (as the case may be), from natural alcaliferous silicates, the residuum of the process being available as a material for manure, puzzolano, or hydraulic cement. Partly a communication from F. Wynants, of Brussels.

3186. William Henry Tooth, of Sumner-street, Southwark, engineer and ironfounder. Improvements in furnaces.

3187. Francis Palling, of Princes-road, clerk. The construction of candles, lamps, and candle-lamps, without wicks.

3188. Tempest Booth, of Manchester, manufacturer. Improvements in the treatment of certain vegetable matters, and in the application of the same to sizeing, stiffening, dressing, and finishing textile materials, and which is also applicable to thickening colours for printing.

3189. James Darsie Morrison, of Edinburgh, dentist. Improvements in effecting surgical and medical operations by the agency of artificially induced anæsthesia.

3190. John O'Neill, of Liverpool, billiard and bagatelle maker. Improvements in apparatus for communicating betwixt the guard or passengers, and the engine-driver on railway trains.

3191. Alfred Vincent Newton, of Chancery-lane. Improved machinery for cutting corks and bungs. A communication.

3193. Richard Harmer, of Union-street, Spitalfields, clerk. Improvements in cigarettes.

Dated December 31, 1857.

3194. Carl Buhring, of Camden Town, gentleman. Improvements in the combination of carbonized and carbonizable with other materials, and the manufacture of such compounds into various useful articles.

3195. Henry Hanson, of Stockport, rope manufacturer. Improvements in the manufacture and finish of cotton-band, twine, rope, cordage, and other fibrous substances, and in machinery or apparatus employed therein.

3196. Peter William Barlow, of Great George-street, Westminster. Improvements in the permanent way of railways.

3197. Augustin Julien Michel Ramar, of Broad-street, Golden-square. Improvements in ornamental and portable fountains.

3198. George Wilson, of Sheffield, steel manufacturer. Improvements in the furnaces or fire-places of steam boilers. A communication.

3199. William Middleship, of Grove-terrace, Mile-end, officer of Her Majesty's Customs. Improved machinery or apparatus for obtaining motive power.

3200. James Long, of Gorleston, Norfolk. Improvements in the construction of sewers, and in the means of discharging the contents thereof.

Dated January 1, 1858.

1. John Henry, of Friday-street, manufacturer. Improvements in weaving fabrics for ladies' dresses and petticoats.

3. Louis Joseph Arséne Brun, of Paris, merchant. Improvements in instruments for measuring angles, applicable to nautical and other purposes.

4. George Gorle, of Handsworth, Stafford, plumber. A new or improved service-box for water-closets.

5. Alexander and Henry Parkes, of Birmingham. Improvements in the manufacture of rods, wire, nails, and tubes.

6. John William Clare, of Surrey-square, civil engineer. Improvements in steam engines and boilers, part of which improvements is applicable to furnaces.

7. John Henry Johnson, of Lincoln's-inn-fields. Improvements in penholders, pencil cases, and other articles sliding in cases of a like nature. A communication from L. C. Riattot, of Paris.

Dated January 2, 1858.

8. Robert Harvey, of Glasgow, engineer. Improvements in steam hammers.

9. Archibald Slate, of Adelaide-road, Haverstock-hill. Improvements in apparatus for supplying fuel to blast furnaces.

Dated January 4, 1858.

10. Thomas Scott, of Drummond-street, Euston-square. Improvements in cleaning, separating, and mixing seeds, and in apparatus for those purposes.

12. Frederick Walton, of Haughton Dale Mills, Manchester, card manufacturer. Improvements in the manufacture of sheets or plates made of plastic compositions and other materials, and in the application thereof, either alone or in combination with other substances, to the manufacture of knife handles, mouldings, artificial veneers, floor cloths, and other ornamental and useful purposes.

Dated January 5, 1858.

14. James Ellis and Joseph Henry Ellis, of Leicester, merchants. Improvements in machinery for subdividing or reducing into small particles masses of rock and minerals.

16. James Leeming, of Bradford, York, machine maker, and John Carter Ramsden, of the same place, manufacturer. Improvements in looms for weaving.

18. George Edward Dering, of Lockleys, Hertford. Improvements in electric telegraphs and in the manufacture of insulated wire and cables.

Dated January 6, 1858.

20. Richard Archibald Brooman, of 166, Fleet-street, London, Editor of the *Mechanics' Magazine* and Patent Agent. An improved lock buckle. A communication from Laurent Cordier, of Dijon.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," January* 19, 1858.)

2338. G. J. Mackelcan. Improvements in floating docks.
2339. G. J. Parson. Improvements in the mode of generating steam in the boilers of steam-engines, and in raising the temperature of steam for other uses.
2357. W. Jamieson. Certain improvements in looms for weaving figured fabrics.
2359. R. Houchin. An improved press for punching, stamping, and embossing or otherwise, for cutting out paper, leather, or other materials and for fixing and closing eyelets.
2370. S. and W. H. Colbeck. Improvements in looms.
2374. C. Watson. An improved apparatus for curing certain bodily complaints.
2384. D. T. Lee. A new or improved washing machine.
2388. J. Ashby. Machinery for cleaning wheat and other grain or seed from smut and other injurious matters.
2389. J. Walmsley and T. Howard. Improvements in machinery or apparatus for warping, sizing, or dressing and winding-on yarns or threads.
2390. T. Grahame. Improvements in grinding corn and in generating gas on inland waters.
2392. T. Archer, jun. Improvements in machinery for cutting off and heading lengths of metal applicable to the manufacture of rivets and other articles.
2406. P. A. de Fontaine Moreau. An improved railway brake. A communication.
2409. E. Hayes. Improvements in winding apparatus for hauling ploughs and other agricultural implements.
2419. D. Imhof. Certain improvements in machinery adapted to the exhausting or forcing of air, gases, or vapour, and in the application of such machinery to various useful purposes.
2431. J. W. Burton and G. Pye. Improvements in the construction of rollers used for pressing fabrics and fibrous and other materials.
2445. G. Schaub. A new or improved manufacture of rollers or cylinders, with patterns or designs thereon for printing fabrics and other materials.
2446. L. F. Picot. Improvements in salinometers or instruments for indicating the saturation of water in marine boilers.
2479. A. V. Newton. Improvements in rock-drilling machinery. A communication.
2487. G. Speight. Improved head plaits, foundations for wigs, bracelets, and other plaited ornaments for personal wear.
2514. C. C. Creeke. Improvements in the construction or manufacture of earthenware pipes.
2605. F. Prestage. Improvements in the furnaces of locomotive and other steam boilers.
2703. R. and H. Harrild. An improvement in the manufacture of the composition used for printers' rollers.
2735. W. Clark. An improvement in rails for railways. A communication.
2937. J. Livesey. Improvements in the manufacture of pile fabrics, and in the machinery employed therein.
3065. J. De Normann and W. T. Henley. Improvements in machinery for preventing the overlapping of chains or ropes when used on drums or shafts, which improvements can be applied to the laying of telegraphic cables.
3067. J. M. Préaud. An improved engine, with rotary piston, applicable to various purposes. A communication.
3137. A. R. de Normandy. Improvements in apparatus used for distilling sea water on board ships and vessels.
3161. B. Burleigh and F. L. Danchell. Certain improvements in the manufacture of vessels, plates, or utensils, used for domestic, sanitary, electric, and manufacturing purposes.
3173. J. Wadsworth. Improvements in the production and management of artificial light, and in apparatus applicable thereto.
3182. V. Mourot. Improvements in furnaces for heating kilns and ovens used in the manufacture of pottery and earthenware, part of which improvements are also applicable to furnaces generally.
3. L. J. A. Brun. Improvements in instruments for measuring angles, applicable to nautical and other purposes.
16. J. Leeming and J. C. Ramsden. Improvements in looms for weaving.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

85. Christopher Turner.
95. Gustav Warnecke.
106. George Riley.
114. James Lee Norton.
115. Jonathan Saunders.
116. Jean Antoine François Victor Oudin.
129. Constant Jouffroy Duméry.
231. Henry Davis Pochin.

LIST OF SEALED PATENTS.

Sealed January 15th, 1858.

1996. Richard Bolton.
2041. Nicolas Saintard.
2165. Paul Emile Laviron.
2253. Alfred Vincent Newton.
2317. William Edward Newton.
2324. William Edward Newton.
2680. Robert Atkinson and Thomas Brearey.
2923. Thomas Glover and Alexander Bain.

Sealed January 19th, 1858.

2025. William Hudson and Christopher Catlow.
2027. Charles Norris.
2029. James Burrows.
2035. Frederick Oetzmann and Thomas Luis Plumb.
2161. William Edward Newton.
2383. Alexander Gray.
2507. William Edward Newton.
2593. William Edward Newton.
2819. Henry Bessemer.
2849. Edward Halliday Ashcroft.
2945. Antoine and Jean Martin.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICES TO CORRESPONDENTS.

J. Starley.—If you read the article on "Mann's Safety Apparatus" attentively, you will find it is based upon a very simple arrangement. In your suggestion there is nothing new.

One of the Illiterate.—We do not think the use of steam, as proposed by you, so advantageous as the application of it to pumps for the purpose in the usual manner.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

CONTENTS OF THIS NUMBER.

Captain Kynaston's Patent Slip or Disengaging Hook (*with engravings*) ... 73
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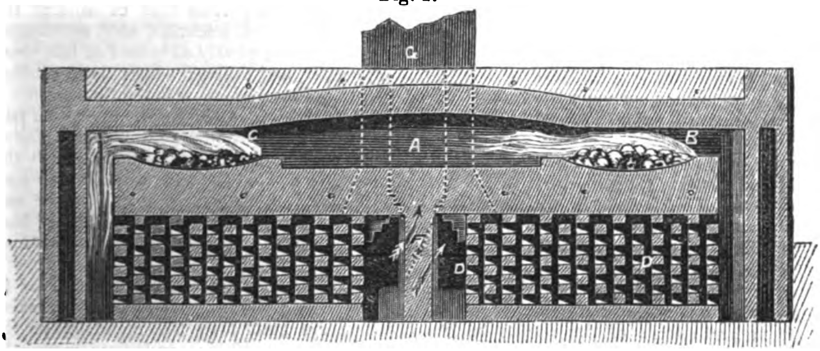
SIEMENS' PATENT REGENERATIVE FURNACE.

Fig. 1.



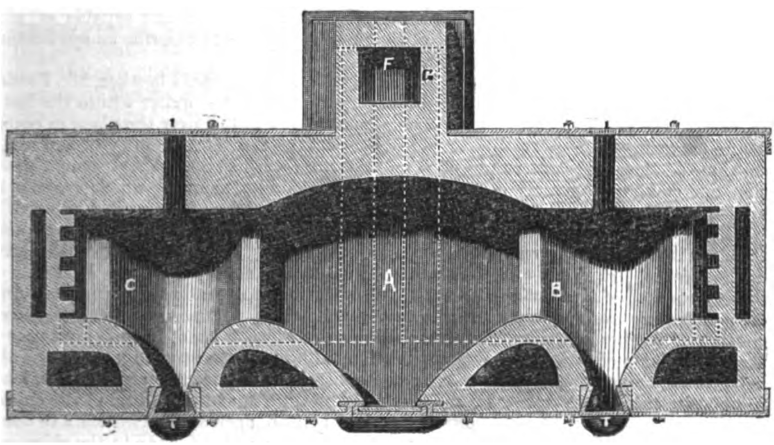
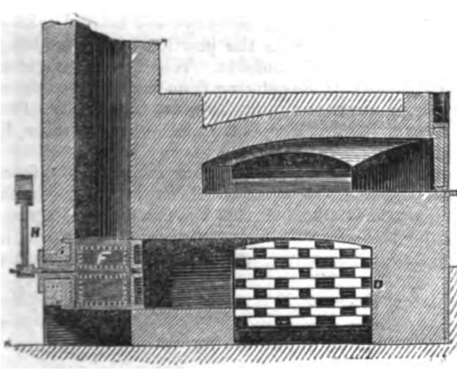


Fig. 2.



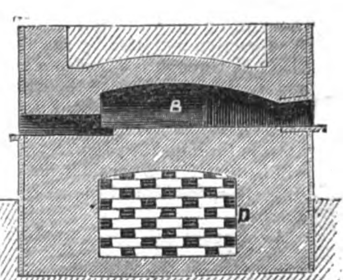


Fig. 3. Fig. 4.

SIEMENS' PATENT REGENERATIVE FURNACE.

At a late Meeting of the Institution of Mechanical Engineers, at Manchester, Mr. Charles William Siemens read a paper on a new construction of furnace, particularly applicable where *intense heat* is required. The high importance of the stores of combustible material which are distributed upon the surface of the earth, said the speaker, renders their wasteful expenditure and rapid diminution in quantity in many parts a serious subject for consideration; and in the writer's opinion there is no object more worthy of the earnest attention of engineers and men of science generally than that of causing the generation and application of heat to be conducted upon scientific and economical principles. Our knowledge of the nature of heat has been greatly advanced of late years by the investigations of Mr. J. P. Joule, of Manchester, and others; which have enabled us to appreciate correctly the theoretical equivalent of mechanical effect or power for a given expenditure of heat. We are enabled by this new dynamic theory of heat to tell, for instance, that in working an engine of the most approved description we utilise at most only one-sixth to one-eighth part of the heat that is actually communicated to the boiler, allowing the remainder to be washed away by a flood of cold water in the condenser. If we investigate the operations of melting and heating metals, and indeed any operation where intense heat is required, we find that a still larger proportion of heat is lost, amounting in some cases to more than ninety per cent. of the total heat produced.

Impressed by these views, the writer has for many years devoted much attention to carrying out some conceptions of his own for obtaining the proper equivalent of effect from heat: some of the results he has obtained are known to the members of the Institution, amongst which are the Regenerative Steam Engine and Condenser, the Regenerative Evaporator, and an apparatus for the economic production of Ice. The regenerative principle appears to be of very great importance and capable of almost universal application; and the object of the present paper is to describe an application of this principle to furnaces of every description.

The invention of the Regenerative Furnace is due to the writer's brother, Mr. Frederick Siemens; and it has been matured and variously applied by the writer within the last few months. The result has in all cases been a large saving in fuel over the plans in common use, amounting to from seventy to eighty per cent. of the total quantity of fuel hitherto consumed. The apparatus employed is moreover of a very simple and permanent description, and combines economy of fuel with other advantages, amongst which are the total prevention of smoke and a general improvement in the quality of the work produced.

The engraving on the preceding page represents the new furnace in the form applicable to piling iron, or heating iron, steel, or other substances. Fig. 1 is a longitudinal section of the furnace, and Fig. 2 a sectional plan; Figs. 3 and 4 are transverse sections. The furnace consists of the heated chamber, A, and of two fireplaces or solid hearths, B and C, communicating respectively with the two regenerators, D and E. Each regenerator consists of a series of walls of firebrick, laid in open Flemish bond, in such a manner that the pigeon holes of each wall are opposite the solid parts of the succeeding wall, the object being to form a number of zigzag or tortuous passages through the regenerators, leading to opposite sides of the valve, F, shown dotted in Fig. 1, at the bottom of the chimney, G. The valve, F, consists of a rectangular box of iron open at the two sides to the two regenerators, D and E, at the bottom, to the atmosphere, and at the top to the chimney, G. A spindle passes through the centre of the two remaining close sides of the box, and carries a ractangular flap or moveable plate, fitting the box sideways and bearing against one of its upper and one of its lower edges, according to the position of the tumbling lever and weight, H, which are fixed upon the spindle outside. When the valve is in the position shown dotted in Fig. 1, the atmospheric air entering from below proceeds in the direction indicated by the arrows, passing through the regenerator, D, over the fireplace, B, through the heated chamber, A, over the fireplace, C, through the regenerator, E, and by the valve, F, into the chimney, G.

A fire having been lighted upon the hearth, B, through the side opening, K, the flame passes through the furnace and through the regenerator, E, to the chimney, G. In its passage through the regenerator, E, the first perforated wall that the flame strikes against will be heated to a considerable degree, the second wall to a lower degree, and so on in succession, the heat of the current being thoroughly exhausted by the time it reaches the chimney.

After about one hour's work the position of the valve, F, is reversed, and fuel is supplied

through the opening, L, to the second fireplace, C, which is then acted upon by a current proceeding in the opposite direction to that indicated by the arrows. The cold atmospheric air comes in contact first with the least heated wall of the regenerator, E, and then with the more heated walls successively, acquiring thereby a degree of temperature approaching the temperature of the heated current which previously entered the same regenerator. The heat thus imparted to the fresh air greatly increases the temperature of the flame which is now being produced upon the hearth, C, and consequently the nearest end of the regenerator, D, will be heated also to an increased degree, the current reaching the chimney comparatively cool.

When the valve, F, is again reversed, the fresh air will be heated nearly to the increased temperature of the hot end of the regenerator, D, and will produce a still hotter flame with the fuel supplied to the hearth, B. It is evident that by a continuation of this process an accumulation of heat to any degree may be produced within the furnace, provided only the heat produced in combustion is greater than the heat lost by radiation and the heat absorbed by the metal or other substances in the heating chamber.

In the regenerative furnace now described, the temperature at which the heat is communicated to the materials does not affect the quantity of fuel requisite, except so far as increased radiation is concerned; for the products of combustion pass away in all cases at a temperature not above 200° or 300° Fahr. This new principle of furnace is therefore applicable with the greatest advantage in cases where intense heat is required. It has been applied to furnaces for reheating steel and iron, at the works of Messrs. Marriott and Atkinson at Sheffield. One of these furnaces has now been in constant work for nearly three months; and according to a statement received from Mr. Atkinson it has worked quite satisfactorily, and the result of a careful comparison has shown a saving of 79 per cent. to be effected over the whole furnace in heating the same quantity of metal. Mr. Atkinson has also applied this principle of furnace for melting cast steel, and has obtained a still larger saving, although the new melting furnace has not yet been rendered entirely satisfactory for the workman.

The regenerative furnace has also been applied to the purpose of puddling iron; and though the new puddling furnace has been completed and worked only for a few days at the works of Messrs. Rushton and Eckersley at Bolton, the writer is able to state that it converts a charge of 480 lbs. of pig metal into wrought iron with an expenditure of only 160 lbs. of common coal, as compared with 6 cwt. required in the ordinary furnaces: the net yield of wrought iron is higher than that of the ordinary puddling furnace, and the quality of the iron produced seems also to be superior. It is also worth mentioning that the chimney of this puddling furnace may be watched for hours, and no trace of smoke be seen issuing from it. Several other applications of this principle of furnace are contemplated by the writer, which it would be premature to enter upon on the present occasion.

The reading of the paper was followed by a discussion, in which several facts, all favourable to the regenerative furnace, were elicited.

THE PURIFICATION OF WATER.

BY DESMOND G. FITZGERALD.

ALTHOUGH it is scarcely necessary to advert to the extreme importance of a ready supply of pure, wholesome water; yet a few remarks to insist upon the necessity of greater attention than is usually paid to this point may be appropriate.

We may premise that there is a class of persons who object on principle to the careful precautions that a due regard to health, economy, and convenience must render indispensable. They do not consider it *natural* that man should filter his water, render it acid or alkaline, or remove the various salts that nature has dissolved therein; he is not called upon, they say, to take so much care and trouble with every simple article of diet, but should receive it as given by the hand of *Providence*.

All this is very plausible, and calculated to save a great amount of trouble, or rather of care, for it is to our *mental* indolence that such objections minister, and thus, as in many other cases, "the wish is father to the thought." The truth is, that such care and trouble become necessary when man lives with his fellow-man in a state of civilization, in which he cannot roam from place to place in quest of the necessaries of life, nor choose the rivulet or spring which is to furnish his supply of sweet and unpolluted water.

Impure and unwholesome water certainly

gives rise to a considerable proportion of the diseases to which humanity is liable. Its organic impurities stand in intimate connexion with *cholera*, *fever*, and those diseases—more frequent than is generally supposed—in which the animal tissues are attacked by a vegetation of fungoid growth. Its contamination with lead produces *colic*, more especially in the case of children; and its earthy carbonates may act medicinally, like an ill-advised prescription, to the detriment of health. But the effect most to be dreaded from an excess of these salts is the formation of *calculus*, and other diseases of a similar character.

Turning from the sanitary to the economic disadvantages of hard water—for water is termed *hard* when its earthy salts are in considerable proportion—we may notice that in *washing* it necessitates a considerable waste of soap or soda to neutralize its pernicious property, and is, withal, inferior in every respect to *soft* water. It is unfit for the purposes of brewing and making tea; and its irritating and disagreeable effect upon the skin when it is used for the requirements of the toilet must have been experienced by all. A recipe *for rendering hard water soft*, quoted in Hassall's work upon Food, from the evidence of Mr. Philip Holland before the General Board of Health, will be found at the conclusion of this article.

Water containing organic impurities is generally either acid or alkaline in its reaction; and the investigations of microscopic science have discovered the important and interesting fact, that in one case the living productions are chiefly of animal, in the other, of vegetable nature. The indications afforded by these minute bodies are of the greatest importance to the analyst in the determination of the quality or properties of water. When, for instance, the microscope reveals large numbers of living *infusoria*, he may safely conclude that the water is alkaline in its character, and contains the fluid organic matter necessary for the sustenance of these living productions; and, when certain varieties of worms and infusoria, well known to be associated with putrefaction, such as *annelidæ* and *paramecia*, are found to be present, he may be equally certain that this organic matter is in an advanced state of decomposition, and possessed of the properties of the putrid organic poisons. But the fact we wish to impress upon our readers is, that the addition of an *acid* to water containing the above-mentioned indices of decomposition, not only immediately destroys the animalcules, but also essentially alters its condition.

With these preliminary observations, we may proceed to the practical recipes, of which every family should, if necessary, avail itself. For the purification of water, besides an efficient filter, the following substances are required:—

1. The *oxalate of ammonia* in solution, or lime water.
2. *Acetic acid*—*i.e.*, strong vinegar.

To obtain the first-mentioned of these chemicals, one troy ounce of oxalic acid must be dissolved in a quart of water, and as much carbonate of ammonia added as will saturate it. This operation may be performed by the family chemist. The quantity named would soften above thirty gallons of water, and need not cost more than fourpence. A small tea-spoonful is generally sufficient for a *pint* of hard water. The sediment formed by it should be allowed to fall, and the water, which is perfectly innoxious, is then fit for any domestic purpose. If, however, an *excess* of the precipitant has been added, the water acquires a slightly unpleasant taste; it is for this reason that further directions are given for water which is intended to be drunk.

It was ascertained by Professor Clark that the addition of a certain quantity of caustic lime, in solution, to water containing the earthy salts, so far from increasing the proportion of these salts, most effectually removes them. *Lime water*, one of the cheapest of all chemicals, is formed by dissolving in distilled or rain water a small quantity of pure lime. It should be kept carefully excluded from the atmosphere. Rather more than half-a-pint of the lime solution to a gallon of hard water will generally be sufficient for its purification. It should then be filtered, and, if intended for the water bottle, sufficient acetic acid added to it to impart an agreeable, refreshing, and slightly acid taste. When none but impure water is procurable for the purpose of drinking, acetic acid, or the juice of lemon, should in every case be added to it.

GUÉRIN'S AND NEWALL'S RAILWAY BREAKS.

A PAPER descriptive of Guérin's break was read by the inventor, Mons. E. Guérin, of Paris, at the Institution of Civil Engineers, on Tuesday, Jan. 12th, and was discussed at the meeting of the 19th inst. As the break was very fully described and illustrated at p. 265 of our 67th vol., No. 1,780, for Sept. 19, 1857, we need not repeat its description here. In Mons. Guérin's paper, it was stated that the apparatus had been extensively adopted in France, and was about to be tried on some English lines. It

was simple, cheap, and effective; and, though useful for all trains, it was peculiarly adapted for passenger trains travelling at high velocities. In several instances serious accidents had evidently been avoided by the rapidity with which the breaks could be brought to bear upon all the wheels of a train; and it was submitted that on English railways, where such high rates of travelling were common, they were almost indispensable.

The discussion upon the 19th was continued throughout the evening. It was remarked that, in 1841, the late Mr. George Stephenson had stated before a Select Committee of the House of Commons that breaks had a very important influence upon the safety of railway travelling, and expressed the opinion that if a self-acting break power could be brought to bear simultaneously upon all the carriages in a train, it would be infinitely superior to a separate break and breaksman to each carriage. The non-success of many plans which had been tried was attributed to the desire to make them automatic, the apparatus for which prevented the free use of the break in shunting, or when standing in sidings.

A description was then given of Mr. Newall's system of breaks, which had been in successful operation for the last five years on the East Lancashire Railway, and which was fitted to all the rolling stock on the Manchester, Sheffield, and Lincolnshire, and on the St. Helen's Railways. It was also in partial use on six or seven other English lines, as well as on the Great Northern of France. This system was not intended to be automatic, except in such cases as the breaking loose of a portion of the train, or the liberation of the catches by some violent action. The guard or engine-driver could instantly and simultaneously apply all the breaks in a train, which were only kept out of action by a balance-catch easily liberated. In ordinary breaks, power was required to apply the pressure; but in Mr. Newall's system, on the contrary, power was necessary to remove it. In this apparatus, a spiral steel spring $3\frac{1}{2}$ inches in diameter, contained in a cylinder, operated upon the breaks, either through the intervention of a long lever, when placed vertically or directly on an arm of the rocking shaft, when placed horizontally. The whole of the breaks were connected together by a long shaft running under the carriages throughout the entire length of the train. The spring was drawn up ready for action by means of a rack, having a piston-head working through the open end of the cylinder. The opposite end of the rack was connected either with the long lever, or with the arm of the rocking shaft. As this rack was geared by a pinion with the shaft running the entire length of the train, it would be evident that all the break springs would be operated upon at the same moment. The long bar was made to revolve through bevil gearing, at each end of an upright shaft connected with the guard's handle, on the spindle of which a ratchet-wheel was set; this was prevented from revolving by a light catch, weighted at the opposite end, so as to fall off readily, and to keep out of action except when put on by hand. Whenever this catch was released, the breaks instantaneously came into action. This could be effected either by a slight reverse motion of the guard's handle, or of that of the tender break, or by a signal cord, such as was used on the Great Northern Railway, or by a small incline plane attached to the fixed signals on the line, or a hand-block laid between the rails, which, catching the foot-roller of the upright bar, forced it up, and lifted the catch.

The connecting bar, running the whole length of the train, was made of iron tubing, 2 inches in diameter, with an extending slide about 6 feet in length, of square iron, working in a steel square in the tube. This allowed for the different lengths of the buffers and the extension of the train; whilst the double ball and socket joints at each coupling allowed for the differences in the heights of the carriages, and for the curvature of the trains.

Several applications of the same principle were described.

Mr. Newall's breaks had not been found to get out of order, and the *employés* had great confidence in their action. The prominent advantages were, promptness of action—bringing up the train steadily without any jerking and consequent risk of breakage—being self-acting when any accident happened—and each single vehicle, being fitted with the apparatus, formed a complete break.

A review was given of the various "breaks" that had been attempted, and had been partially introduced.

Mons. Guérin's breaks acted by the momentum of the train through the medium of the buffer spring, which was also made to slide forward, but with the important difference to all the others, of the momentum of the train being made to act upon a centrifugal governor on the axle of one pair of wheels; this contrivance enabled a lock-bar to be thrown in, or out of gear, and so to regulate the action of the breaks, without any manual labour, as to permit the backing of the carriages, and to do away with any continuous connexion.

The skidding of the wheels was no doubt a great evil, to be avoided by any means. It was believed that a sledge-break acting on the rails, through the agency of springs, by the action of the buffers, was the true principle yet to be worked out. By such a process the wheels and the rails would both be saved from injury, and the automatic regulator of Mons. Guérin was a piece of mechanism that could not be dispensed with.

Several engineers had recently made a journey to France, expressly to examine Guérin's break, and they were able to bear very satisfactory testimony to the merits of the system, which had been applied to two hundred carriages on the Orleans Railway alone, and during upwards of three years had been generally approved.

It was noticed, as a peculiarity, that soft cast iron was used instead of wood for the break blocks, and if it did not produce a bad effect upon the tyres, the substitution would be economical.

Both Newall's and Guérin's plans were simple and were adapted to their purposes; the latter being rather the simpler of the two, and they certainly merited a full experiment.

High eulogiums were passed upon the ingenuity of both systems, and whilst it was admitted, that they were susceptible of being made very useful, their adoption must not be forced upon railway companies until, by continued use for some considerable period, their merits and capabilities were fully developed.

It was announced, that during the next week a trial of Guérin's Breaks would be made on the South Eastern Railway.

THE IRON TRADE.

(FROM OUR CORRESPONDENT AT WOLVERHAMPTON.)

The Leading Feature of the past Month—Twenty Firms Insolvent in one District since the beginning of the Panic—Board of Trade Returns for November, '56 and '57—Returns for '52, '54, and '56—Preliminary and Quarterly Meetings—Reductions in Iron and Wages—Improvement in Wales.

The past month, although not soon to be forgotten by men engaged in the iron trade, yet has not been productive of many facts calling for record here.

The period that has elapsed since our last notice has been observable more for the fact of its not having been productive of many additional failures. It is well that it has not, for since the commencement of the panic the number of firms that have "gone" in South Staffordshire and East Worcestershire alone, connected with the iron and coal trades, has been, we think we are correct in stating, not fewer than twenty-five.

The following are the Board of Trade Returns for November, 1857 and 1856, respectively:—

	1856.	1857.
Machinery—Steam engines ...	101,516	44,694
,, Other kinds	172,219	252,262
Iron—Pig iron	119,802	108,919
,, Bar and rod iron	454,733	388,982
,, Iron wire	23,591	31,962
,, Cast iron	79,216	60,429
,, Wrought iron	329,410	321,454

The machine trade, it will be seen, except the manufacture of steam-engines, was more flourishing last November than any other; this was owing to the increased shipments to France, Holland, and Australia. Other kinds of machinery fell off more than one-half, the chief activity being occasioned by orders from Spain, though these were executed to a much less extent than during the corresponding period of last year. Pig-iron exports were chiefly to Holland and France, and to the former country there was also a large increase in the exportation of bar and rod-iron. The shipments of both descriptions to the United States declined, while those of cast-iron to the same country increased, but diminished to India and Australia. The decline in wrought-iron was confined to India and the United States.

The annual Blue-book has also been published since our last. We extract the following figures in which the value of the exports in the several years, 1852, 1854, 1856, are shown in the several tables annexed:—

	1852.	1854.	1856.
Iron, pig	557,586	1,244,853	1,385,118
,, Bar and rail	3,279,236	5,598,003	5,924,600
,, Bolt and rod	127,124	133,668	292,924
,, Cast	489,304	727,428	712,177
,, Wire	94,216	168,490	195,034
,, Anchors, grapnels, &c.	204,703	459,233	468,107
,, Hoops	193,727	373,228	418,000
,, Nails	160,001	217,593	269,102
,, Sheets, plate, &c.	1,000,205	2,010,018	2,429,184
,, Old	51,314	60,309	136,090
Machinery:			
Steam-engines	338,222	566,768	819,067
,, Other kinds...	913,138	1,364,092	1,897,386

In the detailed accounts for 1856 bar-iron is separated from railroad iron, the value of the exports of the former being returned at 2,506,755*l.*, and of the latter 4,095,409*l.*, making a total in excess of the amount given in the abstract, the cause of which discrepancy is undiscoverable. The largest exportation of both kinds was to the United States, being bar-iron to the value of 613,031*l.*, and railroad iron,

1,390,549*l*. France was the largest importer of pig-iron, the United States and Holland being next in importance.

The preliminary and quarterly Meetings have been held in the past month. They have resulted in a declared reduction of 20*s*. per ton on all descriptions, making bars 8*l*., hoops 9*l*., and sheets and plates 9*l*. 10*s*.

There has been a shade of improvement in the number of orders since the reduction, but only a shade.

Pigs have experienced a slight upward motion in Staffordshire during that time, in best samples, to the extent of 2*s*. 6*d*. Prices may now be quoted from 3*l*. 5*s*. to 3*l*. 15*s*.

With the reduction in price came a notice of reduction of about 12½ per cent. in workmen's wages, which was meeting with a faint resistance in South Staffordshire at the time of our writing.

In Wales the trade has manifestly improved.

ON THE MECHANICAL KNOWLEDGE OF ANIMALS.

BY GENERAL T. PERRONET THOMPSON, M.P.

It is interesting, and therefore useful, to look at the ways in which what are called the inferior animals display, or, at all events, practise, a knowledge of mechanics. And though part of the cases may be found cited in works on Natural Theology, it is possible they may come with the grace of novelty to some of the readers of the *Mechanics' Magazine*.

Who told the bee that her only chance among the regular polygons lay between the equilateral triangle, the square, and the hexagon; and that if she divided a given extent of comb into an equal number of cells of these figures respectively, the quantity of walling to be provided would approach to the same proportions as in the single figures, which may be set down as something like 9, 8, and 7½?

It would have severely taxed Euclid or Archimedes to assign the proportions in numbers, though by painful processes they might have described lines which, being taken for the sides of the several figures, would make them of equal area. And it was not till the introduction of algebra and the Arabic numerals from the East, that the thing could be done with either ease or exactness. But before Euclid or Archimedes were, the bee knew it all. Nothing is clearer than that where the bee's knowledge came from, neither geometry nor algebra was unknown.

Besides this, the hexagon had the advantages of being stronger from its arch-like form, and better fitted to the bee's body, which was wanted to be introduced. In either of the other figures the area must have been larger to admit the bee, and the strength of the whole fabric consequently diminished.

In tropical countries there is a bird called the "tailor-bird," and I have taken its nest out of a hedge myself. It fastens together two or more leaves of suitable size, with cotton, to contain its nest. But it does not sew them with a continuous thread; it puts the cotton through both, and then forms a knob at each end. So that, in fact, it *rivets* them.

Wild geese show tactical knowledge in their mode of flight. It is not correct to say that when there are only three or four birds they fly in a straight line, one after the other; nor that when more numerous, they assume a wedge-shaped form because angular forms diminish atmospheric resistance. What they do is, in all cases, on one and the same principle. They are anxious to be as close to one another as they can, and for this purpose to make the best stowage of their long necks and legs. This they accomplish by every bird after the first sailing upon what a sailor would call his neighbour's "quarter." This throws the general line into an inclination of perhaps two points, or the fourth part of a right angle, with the wake of each bird; the whole resembling the position of a fleet which, after being formed upon a wind in line of battle astern, has tacked together by signal. And when it happens that a line is formed on both quarters of a particular bird, there arises the form like the letter V; with other transformations on the same principle, which may be observed when the birds are induced to make sudden changes in their array.

Camels in like manner get up on each other's quarter, to be as near as they can, and at the same time stow away their long necks, and have a freedom of motion without jostling; in which is visible something like the principle which leads to the formation of troops into columns and echelons. The Arabian female camel (which is an amiable creature and the only kind the Arabs ride) is fond of getting its head up with the preceding rider's knee, the saddles being all fixed on the croup of the animal, so that the riders sit in the position in which boys are sometimes seen on asses; and in this manner the whole proceed at a shuffling trot, not unlike that of an ass. An Arab chieftain has his horse at hand if wanted, but rides a she camel on a march, as easiest. The Indian male camel used for baggage is an ill-conditioned animal, and would be very likely to pull off any rider it

came too near. The full trot and gallop of a camel are like what might be expected from the most gigantic dray-horse, and would tax the riding-master's first-class recruits to keep their seat without stirrups.

It is undeniable that animals have to some extent the power of learning by experiment; and what is more, of communicating their knowledge to one another. On the first establishment of the colony of Sierra Leone it is on record that goats were brought from the Cape Verd Islands, and perished through eating a poisonous plant, which was afterwards found fatal to camels. At last, however, some goats which had eaten little, escaped with a fit of sickness, and avoided the plant thenceforth. But what was remarkable was that their posterity did the same; being warned, it must be supposed, by their elders.

T. Perronet Thompson.

Eliot Vale, Blackheath, Jan. 27, 1858.

IRON LAND DEFENCES.

BY H. CONYBEARE, C.E., F.G.S.

During the late war it was proved by repeated experiments both in England and France, that wrought-iron plates four inches thick, were proof against heavier shot than could ever be brought to bear against any fortress not on the sea coast, and such plates have been actually applied in practice, and have been deemed a sufficient protection to floating batteries expressly designed to batter down sea-coast defences mounting sixty-eight pounders, and these floating batteries were armed as heavily as the Redan. Why should not the bastions of a land fortress be constructed, like these floating batteries, of shot-proof iron plates, properly framed together, as a substitute for masonry? The end in view, that of affording a certain number of guns a really gun-proof cover, is identical in each case; that end has been attained afloat, by substituting iron for wood; and surely it might be attained ashore by substituting iron for stone, with equal certainty, and with far greater facility and economy than afloat, for the application of so heavy a defensive material to a floating and sea-going craft is evidently a more complicated problem than its application to a structure on land. Such iron bastions would not necessarily cost much more than those of the usual construction, their greater compactness being taken into account, for the guns might be mounted as close together as the battery of a line-of-battle ship and tier above tier, so as to counterbalance the wider front of the enemy's fire. The parapet being only four inches thick, each embrasure would present a range of fire of maximum width in proportion to the space exposed, and that might be reduced to an orifice little larger than the muzzle of the gun, if breech-loading cannon were employed, and the muzzle, being the only part of the gun exposed to the enemy's fire, might be made in a separate piece, as in Mr. Whitworth's rifled cannon, so as to admit of removal and replacement in case of damage. The heaviest hostile fire could produce no sensible impression either on guns so protected or on the men who worked them, nor could such works be breached; and under such conditions the curtains connecting the bastions might be mere earthwork, and the cost of the whole system of enceinte thus reduced below that of the usual modern system, over which it would possess the material advantage of giving to the defence a positive superiority over the attack. The great strength and toughness of wrought iron, the equality of its strength in all directions, the ease with which, in the largest masses, it can be moulded like wax, beneath the steam-hammer, to any form required, and the practicability of making a wrought-iron structure, in a number of pieces, nearly as strong as if only in one piece, combine to render this material the best adapted of any known to resist violent impact, like that of a fire of artillery.*

SHIPS' RUDDERS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—My object in writing to you respecting the cure of vibratory motion in clipper sailing ships, by a groove cut up and down the back of the rudder, was to induce a serious investigation and discussion which might lead to the discovery of the cause of such an important, unique, and *a priori* inexplicable phenomenon. I know that no person acquainted with the mercantile marine of this country could be ignorant of the fact. Some time ago "N. A." 's scepticism would have been justifiable; indeed I was, at least, as sceptical upon the subject as he is, but experience during the last two or three years has made the fact patent to every one connected with the construction, fitting, and navigating of fast sailing ships.

Now, Gentlemen, I am weak enough to be very fond of a joke. I can laugh at the hal-

* Extracted from an "*Introductory Lecture to a Course on the Principles and Practice of Civil Engineering: delivered in December*, 1857, *at the Royal Engineer Establishment for Field Instruction at Chatham*." By Henry Conybeare, F.G.S., M. Inst. C.E. London: Yonge and Crighton, Charles-street, Westminster. 1857.

lucination of "N. A." 's master shipwright, and relish the humour of his story of the old lady who so conveniently mistook the diagnostic of her disease. Still I must express my regret that "N. A." did not institute as rigorous an inquiry with regard to clipper's rudders as he did with regard to the case of the old lady; for if he had taken this precaution he must have refrained from charging me with attempting to play off a contemptible hoax upon your readers, if not with deliberate mendacity.

If "N. A." will make inquiries of Clipper Captains at Lloyd's, or the Jerusalem Coffee House, or call some afternoon at White Lion-court and interrogate the gentlemen who so efficiently discharge the duties of Surveyors to Lloyd's Registration; or wait upon the firms who own clipper ships; or ask at the respectable ship-building establishments of this port; or indeed inquire of any person whose position would render him likely to know anything about the matter; the certainty is that (without a joke) he will "hear of something very much to his advantage." I, myself, have known instances of ships' rudders being refitted and the steering apparatus altered, at great expense, without success; and the ship subsequently cured of her *ague* fit by the simple *nostrum* I have described. The ship-yards at Blackwall and Limehouse have had numerous successful cases—at one yard thirty or forty—and ships are now being built with the groove in consequence of the notoriety of the fact. Really, Gentlemen, if I were to state all the symptoms of the *patients* I have seen operated upon, and the "miraculous" cures that have resulted, I should excite the envy of all the empirics in London.

Permit me to add that I make the above statement deliberately, and I trust no gentleman will impugn it till he has made proper inquiry.

"N. A." objects to Messrs. Green tapering off the rudders of their ships towards the keel. Those experienced ship-builders know well what they are about. They know that they avoid danger of injury to or unshipping the rudder if the ship should *tail* on the ground; that a chain or rope under the keel would escape aft easily; that the *heel* of a ship's rudder may give a great deal of work at the wheel, without producing much effect upon the course of the ship. The part of the rudder most effective for steering, "N. A." may be assured, is considerably above its heel. I know an instance of the heel and a considerable portion of the lower part of the rudder being knocked away, without impairing its steering efficiency.

I fear that I am trespassing too far upon your indulgence, and therefore stop.

I am, Gentlemen,

Your obedient servant,

NAUTICUS.

GENTLEMEN,—"Nauticus" asks a question in Number 1797, which appears to admit of a short and simple "*rationale.*"

When a clean or fine-run ship is sailing at her maximum velocity, the back of the rudder being flat or round, creates a comparative vacuum between the junction of the water through which the ship has passed and the rudder, of greater capacity than that produced by a slow and bluff-run ship; the violent filling up of the space by the uniting water, and what is termed back-water, producing the jarring complained of.

By grooving the back of the rudder, a portion of water is retained and drawn along with the ship, reducing the cavity produced in the wake of the rudder and allowing the divided water from the run to unite more freely and to check vibration, the water in the groove acting like a key, and increasing stability.

The beautiful Baltimore clippers some forty-five years back, with a maximum speed beyond all other vessels afloat, were built with an extremely fine run and a very raking stern-post, which reduced the breadth of the rudder, and with it the "*shaking fit*" which "Nauticus" states to be indisputably relieved by the grooving described in his letter. NEPTUNE.

Jan. 20, 1858.

THE WAVE-LINE SYSTEM.—The following fact has been brought to our notice, and is based upon excellent authority:—A ship has been built with two differently-formed bows—the starboard bow with a slight convex curvature; the port bow with a hollow or wave-line curvature, of about 10½ inches in 50 feet. The result is, that when the port bow is on the lee side the ship "holds a bad wind," and her speed is less by at least 2½ knots per hour than when she is on the other tack.

"BIG BEN."—GENTLEMEN,—Pray use your powerful pen to procure for us a new "Big Ben," without any *ornaments* or *foolish* and *vain inscriptions.* If names *are* to be stuck there, why should *Sir C. Barry's* be omitted? He has more claim to be *registered* than Sir B. Hall or Mr. Denison. How future antiquaries (in the year 2858) will be puzzled to understand what "Q. C." means, when appended to the name of a *bell-founder!*—Yours, AN OLD MAN.

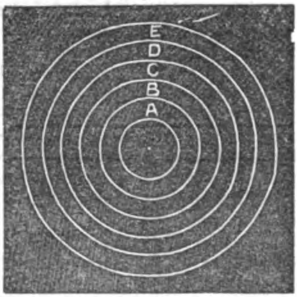
MONSTER GUNS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I would not again address you on a subject of which your readers must be very tired, but that I fear that, from want of ability to make my meaning understood, I have given a wrong impression of the advantages I think could be derived from building guns or cylinders of concentric shells, in preference to casting them in one piece.

The disadvantages of a single thick cylinder will be apparent on considering the case of one made of india-rubber. If we take one proportioned as Fig. 1 (the inner diameter a fourth of the outer), and make 4

Fig. 1.



equi-distant circular marks on its face, then stretch it as in Fig. 2 or Fig. 3, we see at

Fig. 2.

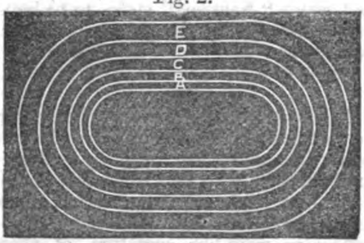
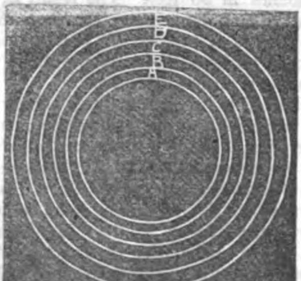


Fig. 3.



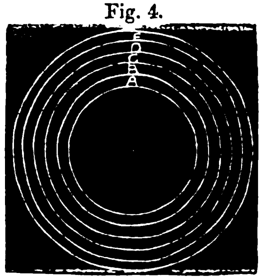
a glance that the inner part is more strained than the outer. In this particular case, the outer ring, E, would only be lengthened about one-eighth, when the inner one, A, is stretched to double its original length; D would be a little more stretched in proportion than E, C than D, and B than C. If the elasticity and strength of all the mass be uniform, of course the inside will break first, if the cylinder be strained till that part is stretched beyond its strength. If A, B, C, D, E, be separate concentric shells, accurately fitted, A, will break first, then B, and so on. If the strain be in exact proportion to the stretching, it is evident that E helps A very little in resisting the pressure from within.

To enable E to take an equal strain with A, it must be made little more than half its present size, and stretched before being passed over D. When the whole cylinder is strained from within, E will then be further stretched a very little. The sum of this final stretching, and that when at rest, caused by the inside of E being smaller than the outside of D, should be such that its ratio to the original size of E, should be the same as that of the stretching of A to the original size of A.

B, C, D, may in like manner be reduced in size, so that the inside of each may be smaller than the outside of the one underneath it, and that the whole can take a nearly equal amount of work at any particular strain, as a very simple calculation will enable one to arrange the sizes, so that the equality of strain shall be when the stretching amounts to any given proportion to the original size.

Fig. 4, shows such a cylinder stretched.

Fig. 4.



It is evident that the *greater* the stretching, the *less* difference of size will be necessary. If a cylinder be formed of a material which will stretch to 50 times its original size, no adjustment will be practically useful, as it must be immaterial whether part is strained to only $\frac{49}{50}$ of its limit, or fully to it. In the small extension of metals, however, it becomes of vital importance to make some adjustment, because with great thicknesses the outside takes such a very small portion of work. Without going into any long

calculation, it will be sufficient to state that the outer layer of an 8-inch gun, as at present cast, with sides 8 inches thick, *cannot* take $\frac{1}{8}$ as much strain as the inside layer. If it did the bulk of the gun must be increased during the strain, for the inside diameter may become about 8·008 inches without danger. If the outside be stretched one-eighth as much it must become 24·003 inches. The cross section, or the difference of the squares of these sizes 576·144009 and 64·128064

would be 512·015925

or nearly $\frac{1}{60}$ of an inch more than the original size, 24^2-8^2 or 512 round inches. I believe that the outside only does $\frac{1}{20}$ of its share of work. Professor Barlow puts it at $\frac{1}{5}$. However, all are agreed that it cannot be $\frac{1}{8}$. Surely, it would be well to replace metal so nearly useless with some which can use its strength. For a gun of this size it would be sufficient to form its thickest part of two concentric cylinders, one 6 inches thick, and therefore 20 inches external diameter—the other 2 inches thick and $19\frac{49}{50}$ internal diameter. The simplest way of putting this over the other would be to heat it first.

The outer cylinder might be in several small rings side by side, and of wrought iron; *but this has nothing to do with the principle I advocate*, for a cylinder of cast steel would be less strong than one formed of several shells, even though some of the latter were of a material slightly weaker than steel.

For very large cannon several concentric layers will be necessary. Of course the greater the number of them in a given thickness the greater the strength. Wire is very convenient for the purpose. Mr. Howard thinks that iron cylinders cannot be made to bear a pressure from within of 20 tons. Will he be so kind as to explain his reason for thinking that one, of cast iron even, could not bear that pressure if made thus? First, a cylinder 10 inches bore and 5 inches thick, then one shrunk over this $10\frac{197}{200}$ inner diameter and 25 outer. Over that, one of $24\frac{49}{50}$ inner diameter and 32 outer. Then one of $31\frac{49}{50}$ inner diameter and 45 outer. Then one of $44\frac{24}{25}$ inner diameter and 60 outer.

If all this mass of metal did its work, we should have a strength sufficient to bear a strain of 30 tons to the square inch from within, calculating 6 tons as the tensile strength of cast iron. Is one-third not enough to allow for a margin? A cylinder of the same size, cast of the same iron in one piece, must commence to tear in the inside with *one-sixth* of the pressure, and a cylinder formed of a single piece of steel would be only as strong as that built up of cast iron.

In the above remarks I have merely wished to give a sketch of the plan I suggest, and have purposely omitted all mention of the elongation of the internal parts in the direction of the axes when pressed upon, and the effects of other cross-strains.

I am, Gentlemen, yours faithfully,

T. A. Blakely.

DRAKE'S IMPROVEMENTS IN CANNON.

To the Editors of the Mechanics' Magazine.

Gentlemen,—When I stated in previous communications that my 12-inch breech-loading guns were invented for coast and harbour defence, I should have observed that their use is not confined to land batteries exclusively, as they are intended for blockships, gunboats, and impregnable floating-batteries on the glancing shot principle, as invented by me for the same object in 1840, and for caisson batteries designed since by Dr. Drake, and submitted to the Select Committee at Woolwich in 1854, the novelty and importance of which commanded much attention and called forth very appropriate remarks, made to me by the Vice-President; but we were deprived by passing events at the time from resuming the discussion. These guns were invented and mounted to overmatch the guns of the regular ships of war, the armament of those ships, although increased considerably in weight since the last war with France, not having the range and destructive power of my 12-inch guns. Some of our old line-of-battle ships, previous to 1800, had 42-pounders on the gun-deck. The *Royal George*, when she sank at Spithead, had brass, and the *Royal Sovereign* iron, of 67 cwt., of the same calibre; but they were found too heavy, and changed for light 32-pounders of 55 cwt.; 32 and 24-pounders were the favourite limits prescribed in those days, from the facility of working; but they were "close-quarter," man-killing, but not ship-destroying, guns; and, as the Americans preferred the latter mode of warfare and a larger class ship, it produced the change in our service from 6 to 8 and 10-inch guns—quite large enough for ocean ships of this class, and are likely to be so considered. Thus the 12-inch guns have the advantage, some, as already observed, weighing 25 tons when mounted; but at the same time, I will venture to repeat with confidence, can be worked by half the number of men employed in working the

common battery gun of 10-inch calibre and 166 cwt.

As shot should not be fired to waste, horizontal is preferable to elevation firing, so as not to ricochet or bound the shot over, but to strike the object with certainty even at a three mile or greater range; and I will undertake to say, no object six feet above the water will be safe within the distance named from shot fired from Dr. Drake's caisson or my floating impregnable batteries.

For coast-batteries some experienced authors prefer elevations above the reach of ship guns; but as objects are limited in distance to be fired at with any degree of certainty from such batteries, the ricochet firing produces a great waste of ammunition. To silence elevated land batteries, my ship guns, constructed and mounted as described in Number 1789 of the *Mechanics' Magazine*, are intended; but, on the impregnable principle on which my land and floating-batteries are constructed for glancing shot, it can be of little consequence if the platform is not one foot above the level of the water, as sea-going ships of war of the present class cannot approach them; and, as an experienced engineer remarked on inspecting them, "had Sebastopol been defended by 12-inch guns so constructed and mounted, our ships could not have approached the harbour or coasts so protected; and if they could, their shot would not produce appreciable injury."

In my letter published in the same number, I had occasion to state, I was prepared to show that my improvements in cannon were not confined to the mere form and mounting, but extended to the material of which guns and mortars were made; and, as the late war with Russia has called into action the inventive spirit of experienced engineers in the working and uses of iron, and, as they have variously applied it for the improvement and strengthening of ordnance, it gives conclusive proof that high professional authority entertains the same opinion which induced me to make those improvements to which I promised to call your attention.

For general use cast iron is employed, and when the weight is not of consequence, there is no reason for changing the material for more expensive, provided the calibre does not exceed 13 inches; but for ordnance of *lighter* duty wrought iron, brass, copper, and gun metal may be used in combination, and of these I have invented variously, as follow :—Cast-iron breach-loading guns and others, with wrought-iron tubes; in the muzzle loading guns the wrought-iron chase is screwed into the breach before the trunnions, with a fine thread; or the tube is continued the whole length of the gun, and contains the charge; or driven in tightly into a bore in the breach end, nicely fitting the tube cylinder, which will expand by heat to a rigid position; or, if introduced with a space between the tube and cast-iron casing, of ⅛ inch, it may be filled up with molten brass to unite the whole in one mass by brazing. The same process to be observed in gun metal or brass-breached guns with a wrought-iron chase.

For light, *portable* field guns, I have constructed them of wrought iron horizontal staves, and hooped or ringed closely on the breech end, with the joints of the staves plain, doweled, or grooved and tongued, if desired; or with a welded iron tube, covered partially with longitudinal wrought iron bars, and hooped; and, as guns have been made of wood for a light charge of powder, the same as stone mortars for short ranges, I can see no objection to constructing battalion guns of wood, with a slight wrought iron tube, and partially hooped on the outside to give additional strength; but I have not attempted to strengthen cast iron guns with wire, although I have hooped the breech end of *re-bored* guns to restore the strength lost by enlarging the calibre, and have otherwise constructed cast iron guns with wrought iron bands, and have reason to believe those guns will be stronger than the original, but more expensive, and much the same in weight, as the chase remains without hooping. For light guns of the Ammuzette class, and mounted rifles of less weight, I have introduced wrought iron throughout—breech loading and otherwise—and have employed wrought iron in the large breech loading guns in combination with cast; but the expense and difficulty of making large cannon of wrought iron precluded its introduction in my plans.

I have ever been an advocate for professional gentlemen giving their attention to practical mechanics, and I have lately seen in the publication of an experienced General of Artillery, that he dates his knowledge of invention to the time he devoted to the practical working of mechanics; and it would be well if our Engineer and Artillery officers, as they fill so many civil appointments as superintendents of practical mechanics, if they were required in their early training to devote a considerable portion of their time to the workshop.

I remain, Gentlemen,

JOHN POAD DRAKE.

January 25, 1858.

IMPROVED ORDNANCE.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—While Captain Blakely and other Artillery officers see the necessity of improving the ordnance of the State, and are urging the Government to give its attention to the subject seriously by the establishment of a scientific and practical Committee of gentlemen well acquainted with mechanical invention, and by relieving the Select Committee at Woolwich from duties which take up time other ways "*fully occupied*," Captain Jervis, R.A.—"*not one of the Select Committee at Woolwich*," as he observes, but attached to the Ordnance Committee at Enfield—appears inclined to urge upon the Government not to allow further improvement to be made, because, in his opinion, it will involve changes of ordnance in England and her colonies, which he considers of an expensive character. "Observer" having been a personal witness of the injurious effects at the Admiralty and Ordnance branches of the Government, attended by a cost to the country of millions within his recollection, of acting upon such a delusive principle, advocated by a certain portion of its officers, considers it an act of public duty to call your attention to its fallacy. But without entering into a lengthy detail of its consequences, which Captain Jervis may not have considered, it may be well to ask, what would be the present state of England had not enterprising and public spirited men, *unconnected with the Government*, brought into use throughout the world those stupendous changes in mechanical science, which as is universally admitted England is benefited by to the extent of hundreds of millions, even since the adoption of railways and steam navigation, and which the Admiralty kept out of the service twenty-five years, under mistaken notions of economy? Suppose, instead of increasing the expense of our naval and military establishments, England can reduce it to *one-third* with safety and efficiency by a due encouragement of practical science, will Captain Jervis or any other gentlemen attached to the public service, say the Government is right in preventing it by such mistaken notions of economy?

'Tis a serious, a very serious thing, Gentlemen, to keep back improvements calculated to benefit the world collectively; and it is to be hoped no man will *willingly* become the champion of a retrograde or standstill Government, if he rightly reflects on its fatal consequences to the rising generation. And if, by improved ordnance, the world can be deprived of a wanton power of making a bad use of fighting, those who can prevent it by appropriate invention, in my humble opinion, should not be crushed by an impolitic Executive and its advisers for discharging a duty dear to every right-thinking man. OBSERVER.

January 20, 1858.

MISCELLANEOUS INTELLIGENCE.

THE ITALIAN INFERNAL MACHINES.—The infernal machines used by the Italian conspirators in their recent attempt upon the life of the Emperor Napoleon, are constructed as follows:—Each consisted of a hollow iron cylinder, about 4 inches long and $2\frac{1}{2}$ inches in diameter, divided into two transversely, and terminated at each end by a hemispherical cover. One of these covers was nearly 1 inch thick, and pierced with twenty-five apertures, over which fulminating caps were placed on the exterior. The other cover was considerably lighter, in order that when the missile was thrown from a window or elsewhere, the explosive end might with certainty strike the earth. The cylinder and covers were coated with bronze-colour paint, to conceal the brightness of the metal. The cylinder was filled with fulminate of mercury, or some explosive substance of equal intensity, in consequence of which the murderous manufacturers had taken great precautions in charging them. Instead of screwing the two parts of the cylinder together, which might have been dangerous, they merely placed one part within the other, and soldered round the joint on the outside. Other careful arrangements were also adopted. The explosive force of these terrible missiles may be conjectured from the fact, that the fulminating powder employed is fifty times more powerful in its effects than common gunpowder.

MR. J. SCOTT RUSSELL'S PATENT SLIPS FOR SHIPS.—Heretofore, in constructing slips, it has been usual so to arrange them, and the apparatus connected with them, that the ships to be raised may be received and moved up or down thereon with their keels parallel to the lines or ways of the ships. Mr. J. Scott Russell has just patented improvements upon this method, consisting in constructing slips and the apparatus connected therewith, so that the keels of the ships to be raised or moved may be received on them transversely, or across the fixed ways or rails; and where the extent of frontage is considerable, it is desirable to construct the carriages used to receive the ships of several parts, each capable (by its chain and capstan, or their tackle, or other mechanical contrivances

used therewith) of being moved up and down the fixed ways or rails, and also of being used conjointly with other carriages when the length of the ship to be received and moved requires the combined use of several.

A CURIOUS STEAM-ENGINE.—M. Hippolyte Lamy, of Paris, has obtained a patent in this country for a very curious engine, which he denominates "the Organic Engine," from the fact of its being an imitation of the human organization. It consists, says the patentee, of a heart divided into two distinct parts, each comprising two compartments or cells, one of which contains the arterial or acting steam, the other the veinous steam, or the steam which has already exerted its working power. The heart is represented by two cylinders, the motion of the piston exactly simulating the motions of systole and diastole. There are two lungs, the conformation of which resembles as nearly as possible that of the lungs of animals, presenting under a given volume a very large surface. There are to be seen veins, arteries, glands, and a stomach, the functions of which are of the same nature as those of the stomachs of animals. The steam represents the blood, and as the blood consists of a liquid which *drifts* various substances, so the steam acts, as it were, as a vehicle of the heat which constitutes the force, or the life of the engine. The leakage corresponds to the secretions, and the radiation of the engine may be compared to cutaneous perspiration. The inventor proposes to substitute his engine for the engines in common use on our railways, which he compares "to a man who has a vein constantly open out of which the blood incessantly runs, and who requires a constant and large supply of food and drink in order to recover the blood lost."

LIGHTING RAILWAY CARRIAGES WITH GAS.—Yesterday afternoon we had an opportunity of inspecting, on the Dublin and Kingstown Railway, the working of an apparatus for lighting railway carriages with gas—the invention of T. J. Thompson, C.E., Newry, who, we understand, has taken out two patents for it in England, two in France, and one in Belgium. Mr. Thompson asserts that, by the use of gas, a saving of fully 300 per cent. will be accomplished. We believe, from the explanations afforded us, that the apparatus is susceptible of almost universal application. Mr. Thompson's plan embraces not alone the lighting of the interior of the carriage, but also supplying the side and "tail" lights. Mr. Thompson has been upwards of a year maturing the invention, which he now considers perfect. All the parties who witnessed the working of the apparatus—among whom were the Chairman of the Company, W. F. Darley, Esq., LL.D., James Hone, the Deputy Chairman of the Company; J. F. Waller, Esq., LL.D., and S. W. Haughton, the Locomotive Superintendent—expressed themselves highly satisfied with it, and appeared sanguine of its complete success.—*Freeman's Journal.*

SPECIFICATIONS OF PATENTS RECENTLY FILED.

TILGHMAN, B. C. *Improvements in treating fatty and oily substances.* Dated May 2, 1857. (No. 1244.)

The patentee claims the hardening of acid and neutral fatty substances by subjecting them to the action of sulphurous acid at elevated temperatures, with or without pressure. Also, the use of oxide of copper to remove from fat acids the sulphuretted impurity produced therein by treatment with sulphurous acid.

MARLAND, J. *Improvements in cop tubes used in spinning.* Dated May 2, 1857. (No. 1245.)

This consists, 1st, in applying gutta percha in combination with charcoal in making cop tubes; 2d, in making cop tubes (when using gutta percha) of a conical form, thicker at the bottom than at the top, and suitable for spinning on the bare spindles, except in forming the bottoms of the cops.

WILEY, W. E. *Improvements in boxes or cases for containing needles, leads for pencils, pens, and other articles.* Dated May 2, 1857. (No. 1246.)

Each box is made with compartments. At the delivery end a curved cover is applied, capable of moving on a curved end, formed with an opening. The curved cover by its movement on the curved end opens or closes the box.

BOOTH, J. P. *An improved manufacture of stuffing for beds, couches, cushions, and other seats.* Dated May 2, 1857. (No. 1247.)

This relates to a mode of treating short tanyard hair or hide hair. The patentee prepares a solution of soda, quicklime, and water, and in it boils the hair, adding water as required. But before purifying it, for imparting stiffness to the hair, and adding to its bulk, he immerses it in a glutinous solution produced by boiling down fleshing in water, or dissolving glue therein.

FAIRBAIRN, P., and T. MARSDEN. *Improvements in machinery for heckling flax, hemp, tow, and other fibrous materials.* Dated May 2, 1857. (No. 1248.)

The object here is to enable the heckles of sheet heckling machines to strike closer to the holders than heretofore, and thereby produce a greater yield of finished fibre. The patentees apply to the machine a mechanical arrangement for guiding the heckle bars in the course of their rotation, and causing them to present the heckle pins at right angles, or thereabouts, to the strick before they commence to act on the fibres, and retain that position until they leave the strick.

COOKE, T. J. *Improvements in the manufacture of knobs, roses, and escutcheons used for doors, drawers, shutters, and other similar purposes.* Dated May 2, 1857. (No. 1249.)

The knobs are made partly of brass and partly of iron, and the roses and escutcheons solely of sheet iron. The invention comprises improvements in ornamenting the same, and also in ornamenting ordinary articles of the same kind which are made of brass, by any of the known japanning, enamelling, painting, or inlaying processes.

FOX, J. *Improvements in the music scale, and musical instruments.* Dated May 4, 1857. (No. 1250.)

This relates, 1st, to the formation of the chromatic music scale, and consists in placing additional sounds within the present octave; 2d, to mechanism for applying to organs, &c., certain new keyboards.

GATTI, A. *Improvements in the making of all kinds of seeds, buds, and fruits, for artificial flowers and fruits.* Dated May 4, 1857. (No. 1251.)

This invention cannot be described without engravings.

STANLEY, J. *Improvements in the construction and mode of applying cranes and other hoisting machines, to hoisting, suspending, lowering, and weighing purposes; also, in generating, transmitting, and applying motive power for the same.* Dated May 4, 1857. (No. 1252.)

This invention applies, 1st, to wharf cranes, and all others to which steam-engines are attached and made to turn round their vertical axes with the crane, and provides that the steam-boilers be attached to, and carried upon the moveable parts of such cranes, or made to form the centre column or main support thereof, in order that the engines may be supplied with steam without passing it through the pivots or vertical axis, &c. 2d. To the construction of the boilers of hoisting machines, and provides that their fire-boxes, tubes, &c., be corrugated, fluted, or reeded. 3d. To the mode of transmitting the power of steam in the operation of hoisting, and provides that in connexion with hoisting machines (to which the power of steam produced at any considerable distance is to be transmitted), turbine water-wheels be erected, and supplied with water forced through pipes by the steam, and that the power of such turbines be applied to the hoisting machines. 4th. To the construction of steam-engines connected with cranes and hoisting machines, the working of which is intermittent, and provides that the engines be made to work horizontally, that their exhaust passages be connected with the inside of the cylinder on their under side, &c. 5th. To the variety of degrees of power required in steam hoisting machines, and provides that the engines be arranged to work singly, or two or more together, &c. This invention includes fourteen divisions; the remainder require engravings to illustrate them.

WILEY, W. E. *Improvements in ever-pointed pencils.* Dated May 4, 1857. (No. 1255.)

This refers to that class of ever-pointed pencils wherein the ends of the leads are received and held by the propellers, and consists, 1st, in forming the stem of the propeller elastic, so that it may give way should the passage of the lead be obstructed; 2d. in making them with fixed points, the propeller protruding through the fixed point to facilitate the removal of the last portion, and the introduction of the end of a fresh piece of lead. The holding socket of the propeller is made with an opening behind, to admit of the last portion of lead being removed.

LESLIE, J. *Improvements in apparatus for ventilating buildings.* Dated May 4, 1857. (No. 1256.)

Here an air shaft is fixed to the ceiling so as to rise through the roof, and on the exterior of the air shaft is an enclosed chamber, open at bottom and closed at top. The heated atmosphere of the building will enter the enclosed chamber around the air shaft, keep it warm, and thus induce a rising current through the air shaft.

WAY, J. T. *Improvements in obtaining light by electricity, and in employing light so obtained for lighthouses and for giving signals.* Dated May 4, 1857. (No. 1258.)

This consists in the obtainment of electric light by employing two flowing electrodes, such as two streams of mercury, one connected with each pole of the battery, and issuing from two jets, such streams meeting each other at a point where one or both of them falls into drops. When using the light for signalling he includes in the electric circuit an apparatus for making and breaking the circuit, similar to those em-

ployed for that purpose when telegraphing by electricity. For use in lighthouses, he surrounds it with glass lenses similar to those now in use; and when he desires to obtain a flashing light, arranges a self-acting apparatus actuated by clockwork for breaking the circuit at determined intervals.

TRAVIS, G. *Improvements in apparatus used in the manufacture of cheese.* Dated May 4, 1857. (No. 1259.)

The tub used has at one side two or more holes, one lower than the other, and both below the level of the milk in the tub. These holes are kept plugged till the whey is to be run off, when the plug of the upper hole is removed, and the whey flows from the upper surface of the curd (which is continually pressed downwards) over a sliding gate, kept slightly below the surface. As the gate descends its lower part comes below the second hole, and the whey is discharged through that hole, and so on. The gate is so constructed that it may descend low enough to run off all the whey from the curd.

PETIET, J. A. *Improvements in actuating railway-brakes.* Dated May 4, 1857. (No. 1260.)

This consists in employing a small rotary engine, worked by steam from the boiler of the locomotive, for giving motion to the brake lever. It is preferred that the axis of the rotary engine should, by means of cog-wheels, give motion to an axis on which there is a screw thread, the screw thread working in a nut on which there is a pin which works in a slot in the brake lever.

DAVIS, E. *An improved construction of pressure-gauge.* Dated May 4, 1857. (No. 1262.)

The object here is to avoid the set in the metal diaphragms employed for receiving the pressure, and transmitting motion to the index-hand. Instead of making the diaphragm of thick metal, the patentee makes it of copper by preference, and coated with some less oxidisable substance, and supports the diaphragm behind. This is effected by superimposing on the diaphragm a flat convolute spring, which is held at its periphery between the flanges of the pressure chamber; and upon this convolute spring, and between it and the top of the chamber, he places a number of helical springs, which keep the metal diaphragm in its normal position. The rod which leads to the indicator rests in a steel stop, carried by the convolute spring.

HERRERO, J. *An improved inking and stamping machine.* Dated May 5, 1857. (No. 1264.)

This invention cannot be described without engravings.

PITMAN, J. T. *An improvement in the construction of curry-combs.* (A communication.) Dated May 5, 1857. (No. 1265.)

This consists in the construction of a curry-comb of india-rubber, &c., the teeth being secured by means of wires or hooks. Also in moulding the comb in one piece.

COTTAM, L. Le C. *Improvements in stable-fittings.* Dated May 5, 1857. (No. 1268.)

Here mangers and troughs are arranged to turn on upright axes, so that when not required for use in the stable they turn out therefrom, and present the backs thereof in the form of a flush surface, or the troughs are caused to slide in the manner of a drawer. To fixed water troughs covers are provided, for which purpose a slot is formed at the back of each trough, and a sliding cover descends in an upright position. To cover the troughs the cover is raised or slided up and folded down on the trough. The following composition is used for coating the interior of troughs:—Seed, lac, resin, and spirits of wine, which having been applied and dried thereon, the troughs are placed in an oven to set the coating.

PAUL, W. B. *Improvements in signalling upon railways.* Dated May 5, 1857 (No. 1269.)

This consists in placing along a line of railway a series of electro-magnets fixed near to the rails, and which, when in action, on the passing of a train attract a lever attached to the engine, and so placed as to be brought near the poles of the magnets. This lever being drawn towards the magnets, on coming within their influence, opens a communication between the steam reservoir of the engine and a whistle. There are several methods given for carrying the invention into effect, and for modifying it.

WILKINS, W. *An improved method of laying submarine telegraph cables.* Dated May 5, 1857. (No. 1270.)

This invention was described and illustrated at page 462 of No. 1,788, Vol. 67.

HOOLE, H. E. *Improvements in stove grates.* Dated May 5, 1857. (No. 1272.)

This relates, 1st, to stove grates in which the fuel is supplied by a coal box below the fire, and is raised up to the fire bars as the fuel burns away. 2d, to the construction and mode of operating the valve through which the gaseous products of combustion pass from the fire to the flue. The form and mode of working the valve admits of variations, but the patentee prefers to use a kind of flap valve placed in an

upright position, and hinged at or near its base. Claims, 1st, the use of a moveable coal box, with a moveable bottom, which may be drawn away when required to let the ashes fall. 2d, the application to the coal plate of anti-friction wheels for preventing friction, and a mode of raising or lowering the coal plate. 3d, certain modes of constructing the valves for regulating the draught; also of regulating a compound register.

BISSELL, L. *Improvements in trucks for locomotive engines.* Dated May 5, 1857. (No. 1273.)

This invention cannot be described without engravings.

BECKER, J. P. *Improvements in the mode of silvering animal, vegetable, and mineral objects.* Dated May 6, 1857. (No. 1274.)

This consists in silvering such objects by submitting them to certain fluids, which produce electro-chemical action.

GEYELIN, G. K. *Making oscillating spring laths for beds, couches, and other purposes.* Dated May 16, 1857. (No. 1275.)

Under the laths the patentee fixes a spring, which, being compressed when a person lies or sits upon the bed, couch, &c., forms an elastic sacking, and the laths being passed through a centre box, on whatever part of the bed, &c., a person may sit or lie, every spring of the sacking is acted upon, and the springs can be regulated to any strength by fixing or removing a washer underneath them.

HOOD, W. *An improved charcoal filter for rectifying and cleansing spirits, and which is also applicable for filtering water and other fluids.* Dated May 6, 1857. (No. 1277.)

The object here is to facilitate the process of rectifying or cleansing spirits, &c., by means of compressed air, in connexion with the use of prepared charcoal.

KINDER, A. *Improvements in cutting irregular forms, and in the machinery or apparatus employed therein, or connected therewith.* Dated May 6, 1857. (No. 1279.)

This relates to an arrangement of mechanism for cutting warped or other irregular surfaces in wood, &c., by rotary saws. The invention cannot be intelligibly described without engravings.

SEMPLE, M. *An improved pipe tube, or stem.* Dated May 6, 1857. (No. 1281.)

This invention was described and illustrated at p. 512 of No. 1,790, Vol. 67.

BOUSFIELD, G. T. *Improvements in machinery for pulverizing clay and other substances.* (A communication.) (No. 1282.)

The substance to be pulverized is placed in a hopper, and thence passes into a grated cylinder. To further crush the substance, it is passed through a pair of grooved rollers, one of which is fixed on the main shaft of the machine, the main shaft receiving motion from a steam engine or otherwise. From the main shaft, motion is communicated by a belt to a pulley on a beater shaft, which is made to revolve rapidly. The beaters are arranged in a spiral on the beater shaft. The beaters work within the grated cylinder, which revolves in the opposite direction to that in which the beaters move, and the beaters being arranged spirally, the clay, &c., in addition to receiving violent shocks, is moved gradually from the receiving to the expelled end of the grated cylinder. The clay, &c., as it becomes pulverized, falls out through the gratings of the cylinder, and is stopped and made to fall by the outer casing with which the machine is covered. The stones which do not pass through the gratings are moved along by the beaters, and are discharged by the delivery shoot at the end.

NEWTON, W. E. *Improved machinery for manufacturing paper, part of which is applicable to other purposes.* (A communication.) Dated May 6, 1857. (No. 1283.)

This relates, 1st, to a combination of parts, consisting of a pump, vacuum chamber, air and water chambers, pipes, and vacuum chest, provided with cocks, whereby the pulp on the endless wire cloth apron is compressed, and deprived of moisture by atmospheric pressure, and the edges of the paper trimmed in a perfect manner. 2d, to means for stretching and guiding the endless felt apron which conveys the paper from the wire cloth apron to the usual pressure and heated cylinders.

NEWTON, W. E. *Improvements in locks for doors, safes, and other purposes.* (A communication.) Dated May 6, 1857. (No. 1284.)

This invention cannot be described without engravings.

FONTAINEMOREAU, P. A. L. *Improvements in the preservation of grain and alimentary substances in general.* (A communication.) Dated May 6, 1857. (No. 1286.)

Ether, chloroform, sulphuret of carbon, and other anæsthetic agents are here used for destroying insects and preventing fermentation in the grain, &c.

ZIEGLER, E. *A substitute for animal charcoal, applicable also as a colouring matter.* Dated May 7, 1857. (No. 1287.)

It being the opinion of this patentee that the phosphate of lime in bone black, as well

as carbon itself, occupies no chemical, but purely a mechanical place in the operation of clarifying fluids, &c., he concludes that both the above ingredients might be replaced by a neutral substance possessing fine separating qualities, such as silicious earth or clay. The basis of his substitute for bone black is then a pure clay; it takes the place of phosphate of lime, is capable of very fine comminution, and after sufficient burning is affected neither by acids nor alkalies, and possesses considerable firmness. The clay should be as free as possible from lime, magnesia, &c., and should contain but little quartz sand, which may be removed by washing. Such clay he unites with carbon. Any organic body may be used for the carbon, which, by being burnt in sealed retorts, gives a pure carbonaceous substance. It should, however, be capable of being dissolved. The patentee uses tar generated in gasworks by the dry distillation of organic bodies. The oil may be previously separated by distillation, and applied to other purposes.

Mackworth, H. *Improvements in the classification, preparation, and treatment of mineral substances, coke and furnace cinders, and in removing and depositing such substances, and in machinery and apparatus for such purposes.* Dated May 7, 1857. (No. 1288.)

A large portion of the manual labour employed in manufacture and commerce is applied, says Mr. Mackworth, without the intervention of machinery other than simple tools, to the transport, separation, and delivery of minerals and other materials. The loading and unloading of friable minerals, such as coal, is conducted so as to present a great loss in value from breakage, and the separation or mixing of minerals is performed in an unnecessarily slow, imperfect, and expensive manner. He proposes, therefore, to extend the employment of endless bands for such purposes. The details of the invention require engravings to illustrate them.

Ramie, C. W. *Improvements in the mode of attaching knobs to spindles.* Dated May 7, 1857. (No. 1289.)

The patentee makes use of a square spindle, on the angles of which a screw is cut. At the inner end of the knob is attached a nut, which is free to revolve about its axis, and tapped to fit upon the screwed angles of the spindle. To this nut is attached a washer or escutcheon plate, whereby the nut may be caused to revolve, and the knob thus drawn forward upon the spindle, the end of which, fitting into a corresponding hole in the knob, prevents the latter from revolving thereon.

Bennett, R. *A new or improved method of papering needles, or making up needles for sale.* Dated May 7, 1857. (No. 1290.)

In papering needles, the patentee gums a piece of cloth to the paper wrapper, the said piece of cloth being attached to the paper by its ends, and the middle part loose.

Morrison, D. *A new or improved manufacture of rollers or cylinders for printing fabrics.* Dated May 7, 1857. (No. 1291.)

This consists in making the said rollers or cylinders mainly of cast, malleable, or wrought iron, and afterwards coating them with a layer of copper, by any electro-metallurgical process.

Bright, C. T., and C. de Bergue. *Improvements in apparatus to be employed in the laying or sinking of submarine telegraph cables.* Dated May 7, 1857. (No. 1294.)

This invention was described and illustrated at p. 529 of No. 1,791, Vol. 67.

Dolleans, L. C. *Improvements in ornamenting porcelain, china, opal glass, and similar products by lithographic chromalithographic printing and gilding.* Dated May 7, 1857. (No. 1296.)

This consists, 1st, in the application of proofs of drawings lithographed in several colours, and transferred on porcelain, without touching up either with a brush or the hand. 2d, in the employment of proofs of drawings engraved, either hollow or in relief, on steel, copper, or wood, transferred on lithographic stones, and then printed by lithographic means.

Cambridge, W. C. *Improved machinery for winnowing corn and separating seeds.* Dated May 7, 1857. (No. 1300.)

The grain is received from a hopper on to a reciprocating riddle provided with three screens, one above the other, and in passing down through these screens is subjected to a divided blast of air from a fan. The machine first separates the chaff and light matters from the corn, and deposits them in a receptacle. The corn then falls on to a second sieve, and any husks (that is, corn with chaff adhering) are deposited in a second receptacle. The corn that passes the second screen falls on to an inclined screen, which separates the small kernels or seeds from the larger. The smaller are guided down into a third receptacle, while the heavier slide down the inclined screen, and meet with a second blast, which takes out any remaining light corn, and deposits it in a fourth receptacle. The best sample is conducted to a fifth receptacle.

Tayler, C. *Improvements in the manufacture of sheets of material suitable for*

covering floors, and for other useful purposes. Dated May 7, 1857. (No. 1302.)

This consists, 1st, in the combination of caoutchouc, gutta-percha, and jinta wan, in variable proportions, and incorporating therewith certain vegetable matters. 2d, in manufacturing such compound material into sheets by the application of the machinery usually employed.

DARBY, C. E. *Improvements in collecting the inflammable gases generated in blast furnaces.* Dated May 8, 1857. (No. 1303.)

This consists in collecting the gases by means of a pipe, which descends down through the open mouth of the furnace, and dips into the coal, ore, &c., with which the furnace is charged; or by means of a pipe passing through the side of the furnace, and penetrating into the material, until it approaches the centre of the furnace.

LIPKAN, J. *An improved antisyphilitic compound.* Dated May 8, 1857. (No. 1304.)

Take of bichloride of mercury 1½ drachms, hydrochlorate of ammonia ½ drachm; triturate in a stone mortar; add of tincture of thuja a sufficient quantity, and tannin 1 oz. Agitate the solution in another mortar, and afterwards mix with it chloride of lime 1½ oz., soda soap 1 lb, tincture of thuja 2 oz., oil of cloves ½ drachm, and make into a soap. 1 oz. of this soap is dissolved in 1 lb. of water, and the solution is employed to wash and inject the urethra or vagina within two hours after contact. This soap may be reduced to powder if required.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

MOSELEY, T. B. *An improved pneumatic holder adapted for photographic and other purposes.* Dated May 4, 1857. (No. 1253.)

Here the inventor affixes an annular piece of wood to one end of another piece, which serves as a handle. Into the annular piece he places a bell-shaped piece of india-rubber, and connects it by a wire to one end of a horizontal lever, the fulcrum of which is a pin passing through the handle of the instrument, so that, in raising this instrument, the india-rubber surface is placed upon the article to be held thereby, and, by forcing down the lever, the piece of india-rubber is raised within the annular piece of wood, thereby producing a partial vacuum therein, and causing the india-rubber to adhere to the surface to be held.

HOWARD, J., jun., and W. HOWARD. *Improved apparatus for the manufacture of cheese.* Dated May 4, 1857. (No. 1254.)

Here a hollow perforated moveable strainer in connexion with a tap is fixed to the casing of the apparatus used for drawing off the whey from the curd. The inventor employs compound leverage for exerting pressure upon the curd to express the whey therefrom.

DESBOROUGH, S. *An improvement in the manufacture of the sealed flaps of envelopes and letter paper.* Dated May 4, 1857. (No. 1257.)

The dies used are arranged to puncture the paper above the sealing portions, so that the paper will there more readily separate than the other parts, and will not admit of the sealed portion being opened and resealed.

TURNER, A. *Improvements in the manufacture of elastic fabrics, and for the application of such fabrics to the manufacture of boots and shoes.* Dated May 4, 1857. (No. 1261.)

This relates, 1st, to manufacturing an elastic fabric with an ordinary woven fabric for a foundation, and combining therewith strands of india-rubber, secured by weft threads thrown across by a carrier, such weft threads being secured by two sets of warp threads, that are worked by needles and guides, as described in a former patent of the inventor, dated 15th October, 1856. Other methods of producing the same result are included in this invention.

HEYWOOD, B. J. *An improved construction of self-closing valves, and means for rendering the same applicable for supplying or discharging air, water, and other fluids.* Dated May 4, 1857. (No. 1263.)

This relates to a previous patent of the patentee, dated Jan. 16, 1856, the object being to make the valve capable of hermetically closing a tube or vessel, and of resisting the pressure of confined air, &c., and retaining the same until mechanical aid is employed to force open the valve, and effect the discharge of the confined fluid.

KEDDY, T. *New or improved machinery for cutting sugar and other substances.* Dated May 5, 1857. (No. 1267.)

The sugar-loaf is first divided into a series of discs, in planes perpendicular to the axis, by a machine in which a series of cutters situated in the same plane approach simultaneously, and converge upon the sugar-loaf. The discs of sugar are next put into a hopper, and by means of two knives (one on either side) having an alternating motion the discs are divided into small bars. It is lastly submitted to the action

of another pair of knives cutting it into small square pieces.

EASTERBROOK, J., and R. F. DRURY. *Improvements in machinery or tools for drilling and boring.* Dated May 5, 1857. (No. 1271.)

This relates to those tools for drilling, &c., in which motion is imparted by means of a handle moved successively in reverse directions after the manner of ratchet braces; and consists in fitting the drill, &c., into a sphere carried by a frame which encircles it, and to which frame is jointed a handle, so formed that when it is moved in one direction the short end of it presses against the sphere and carries it round by friction, and when it is moved in the reverse direction the short end releases the sphere, and turns the frame round it. The object in employing the sphere is to give free play to the hand of the workman by allowing him to change the inclination of the handle to the drill, &c.

HINGLEY, B. and S. *Improvements in anchors.* Dated May 6, 1857. (No. 1276.)

This consists, 1st, in making an enlargement on the shank of such anchors as have the flukes jointed to the shank, at that part of the shank against which one of the flukes bears when the anchor is aground. The inventors curve the flukes outwards, so that when the anchor is aground the fluke resting on the ground is sufficiently open to take into the ground. By this method they dispense with the toggle usually employed in hinge anchors. 2d, in making two holes, one on either side of the shank of the anchor, for fishing the anchor.

ROPES, H. T. *Improvements in refrigerators or portable ice-houses.* (A communication.) Dated May 6, 1857. (No. 1278.)

Within a suitable chamber, a horizontal grating is erected near the top, upon which the ice is laid, and at the bottom of the chamber a close water tank is placed. In the top sides of this chamber openings are formed for the admission of air above the ice. The air upon coming in contact with the ice becomes cool, and parts with its moisture, and being thereby rendered heavier, descends to the bottom of the chamber, where it passes through openings into a chamber containing the articles to be preserved.

HOGARTH, H. *An improved apparatus for raising and floating vessels or other heavy bodies.* Dated May 6, 1857. (No. 1280.)

The inventor employs hollow air-tight vessels, fitted with inlet and outlet valves, and by connexions with pumping apparatus he places these over or alongside the body to be raised, having first, by the admission of water, sunk them in their proper position, and attached them by chains and slings. He then pumps out the water to the extent requisite, and thus obtains the necessary buoyant power.

SCHWAB, F. M. *Improvements in breech-loading fire-arms.* Dated May 6, 1857. (No. 1285.)

Here the barrel is open at the breech, and is mounted upon a strong pin. By depressing the muzzle end the breech end is raised and the open end exposed to receive a cartridge. The barrel is then brought again horizontal, and secured by a rotating catch, which enters a notch in a block on the barrel. The holding catch is at the end of a lever by which it is worked, and turns on a vertical pin, cut out of the solid of the action plate of the gun.

ABERDEIN, W. C. *The tubular elastic fastener and stud for gentlemen's shirt collars and wristbands, and other garments.* Dated May 7, 1857. (No. 1292.)

This fastener "is based upon the principle of the elastic passing through a tube composed of gold, silver, or any other metal, including glass, ivory, pearl, bone, or gutta percha," says the inventor. The button or stud that receives the elastic is composed of any like substance.

LLOYD, S., jun. *Improvements in railway wheels, axles, and tyres.* Dated May 7, 1857. (No. 1293.)

This consists, 1, in manufacturing the axles from one ingot or bar of steel; and, 2, in converting the wearing portion of wheels and tyres into steel after having been rolled.

STENHOUSE, J. *Improvements in the manufacture of various kinds of glue or gelatine.* Dated May 7, 1857. (No. 1295.)

Ordinary leather is here boiled under a pressure of about 2 atmospheres, mixed with about 20 per cent. of finely divided carbonate of lime or whiting, and as much water as will dissolve the glue. Almost all the vegetable matter, at the end of 4 or 5 hours, forms an insoluble compound with lime, and the clear liquid yields a large quantity of a glue of good quality. By washing the lime residues with hot water more glue is obtained. Further, white leather in small fragments is washed with cold water (to remove soluble salts), and then subjected in a boiler with water to cover the leather to a pressure of two atmospheres for 4 or 5 hours, and a quantity of a light coloured gelatine is produced. Or the white leather may be treated (in small fragments) like the ordinary leather as above. Instead of carbonate of lime, hydrate of lime, the sulphides of calcium, carbonate or hydrate of magnesia, the

sulphides of magnesium, carbonate or hydrate of baryta, the sulphides of barium, carbonate or hydrate of strontia, or the sulphides of strontium, may be used.

PRICE, G. B. *Improvements in apparatus for affixing stamps and labels to letters and documents.* Dated May 7, 1857. (No. 1297.)

The stamps are deposited in a pile, face downwards, in an open case, resting upon a block inside. The letter to be stamped is moistened (in any way) and the corner pressed down upon the open top of the case by a plate suspended over it, and hinged for filling the box. This causes the case to descend against a spring, until the letter comes in contact with the uppermost stamp. When the pressure is removed the open case springs up again, leaving the rest of the stamps behind.

CRAWFORD, J. *Improvements in heating and cooking apparatus.* Dated May 7, 1857. (No. 1298.)

This relates to portable kitchen ranges, combining an oven, fire-place, boiler, hot press or chamber, and a hot plate or table, with openings for detached cooking vessels. The apparatus is self-contained, and carried upon four-pillar legs, so that it may be set down anywhere for use. The fireplace is in the centre. The bars are vertically down the front, and carried by a bend to form the bottom of the grate. The door has a gridiron valve for the adjustment of the cold air supply to the fire. Above the door is a swinging hopper, which affords access to the fire for the supply of coals, or for stirring. The hot plate extends along the entire range. Various other arrangements are included.

HEDGELY, J. *Improvement in lamps for railway carriages.* Dated May 7, 1857. (No. 1299.)

This relates to roof lamps. 1st, the top of the lamp has a revolving cowl, by which the smoke, &c., escape without admitting cold air into the carriage, which ordinarily produces flickering of the light; or a cowl is fixed to the opening in the lamp-hole in the roof of the carriage, so that when the lamp is away the cowl operates as a ventilator. 2d, for surrounding the light from the wick of the lamp two glasses are placed one over the other, so as to leave space between for the passage of air to support combustion; a hole through the bottom of the innermost glass supplies the air underneath the light, and thus prevents flickering. 3d, the pipes that convey the oil from the reservoir to the wick have stop cocks, which are shut off before filling the reservoir with oil, and afterwards opens, thus the admixture of air therewith is prevented.

WOODWARD, F. G. H. *Medicine for the cure of dropsy.* Dated May 8, 1857. (No. 1301.)

The inventor employs 1 oz. of elicompane root, 1 oz. of stick liquorice peeled, 1 oz. of anniseed, 1 oz. of coriander seed, 1 oz. of guiacum, $\frac{1}{2}$ oz. of jalap root, and $\frac{1}{2}$ lb. of Malaga raisins. These are put into a jar, with two quarts of the Hollands gin, and gently heated for 14 days. When strained the mixture is fit for use.

PROVISIONAL PROTECTIONS.

Dated December 19, 1857.

3117. Thomas Hart., jun., of Blackburn, cotton spinner, and Abel Jones, of the same place, overlooker. Improvements in looms called dobby looms.

Dated December 24, 1857.

3160. George William Hart, of Southsea, accountant. Improvements in the construction of locks, and in apparatus for cutting keys.

Dated December 30, 1857.

3184. John Blake, of Accrington, mechanic, and Richard Dugdale Kay, of the same place, manufacturer. An improved apparatus for reducing and regulating the quantity, force, or pressure of steam.

3192. John Clinton, of Percy-street. Improvements in the manufacture of wind musical instruments played by the mouth, and in mandrils used in such manufacture.

Dated January 4, 1858.

11. Edmond Thomas Tillam, Steward of St. Mary's Hospital, Paddington. Improvements in apparatus for ventilating buildings.

13. Edward Hamlin Kiddle, of Broad-street, Lambeth, miller. Improvements in smut machines.

Dated January 5, 1858.

15. John North Wilkins Twigg, of Coventry, commercial agent, and William Adkins, of Birmingham, linendraper. Certain improvements in self-acting railway brakes.

Dated January 6, 1858.

19. Thomas Fildes Cocker, of Sheffield, manufacturer. Improvements in the manufacture of wire applicable to umbrellas and parasols, and to articles of dress.

21. Henry Constantine Jennings, of Great Tower-street, practical chemist. Improvements in the production and application of tannin or tannic acid.

22. James Drysdale Malcolm, of Leicester-square. Improvements in apparatus for ornamenting fabrics and other surfaces.

Dated January 7, 1858.

23. Manuel Leopold Jonas Lavater, india-rubber manufacturer, of Holywell-lane, Shoreditch. The application of the principle of exhausting air as used in plate-holders, breast pumps for pegs.

25. Christophe Adrien Thiry, of Paris, merchant. A new or improved oyster holder.

27. James Reilly, jun., of Manchester, chair-manufacturer. Improvements in chairs and seats of various descriptions.

29. Richard and John Philp, of Cheltenham, civil engineers. An improvement in propellers for propelling ships, boats, and other vessels in water.

30. Edwin Maw, of the Doncaster Iron Works, Yorkshire. Improvements in the construction of metallic bedsteads and other surfaces to sit or recline on.

31. George Jean De Winton De Winton, of the Junior United Service Club, Saint James', Esq. Improvements in copying apparatus. A communication from H. Genhart, of Liege.

Dated January 8, 1858.

32. Samuel Lees, of Salford, manufacturing chemist. Improvements in the manufacture of mineral oil.

33. Henry Raymond, of Bristol, artisan. Improvements in propelling ships or vessels.

34. Peter Soames and John Campbell Evans, of the Morden Iron Works, East Greenwich, engineers. Improvements in steam-cranes, parts of which improvements are applicable to the generation of steam.

35. Richard Archibald Brooman, of 166, Fleet-street, London, patent agent. A method of and apparatus for teaching music and arithmetic. A communication from Mlle. Fitton, of Paris.

36. Henry Atkins, of Nottingham, lace manufacturer. Producing scarfs, neck-ties, and other articles from the warp machine.

37. Thomas Greenwood and John Batley, of Leeds, machinists. Improvements in machinery for heckling flax and other fibrous materials.

Dated January 9, 1858.

38. Robert Brown, of Liverpool, plumber. Improvements in water-closets, parts of which are applicable to pumps.

39. William Church, of Birmingham, engineer. Improvements in measuring rules, compasses, and other mathematical instruments, and in the machinery to be employed in manufacturing measuring rules and other mathematical instruments.

40. Thomas Rowell, of Sunderland, engineer. Improvements in furnaces.

41. William Parsons and James Attree, both of Brighton, engineers. An improvement in the measuring of water and other liquids, and an improved water and liquid meter.

42. Jules Alphonse Mathieu Chaufour, of Paris. Certain improvements in the construction of axle-boxes and axle bearings.

Dated January 11, 1858.

44. Thomas Knowles, of Hollingrove, Lancaster, joiner, and William Ogilvie, of Manchester, manufacturer. Improvements in looms.

46. William Hartree, of Lewisham-road, Kent, engineer. Improvements in furnaces or fireplaces.

Dated January 12, 1858.

48. André François Emile Robert, of Paris, merchant. Improvements in the manufacture of curtains and hangings for walls and other places.

Dated January 13, 1858.

50. George C. Greenwell, of Radstock, near Bath. An improved pigment.

52. George Walker Muir, of Manchester. Improvements in warming and ventilating.

54. Edward Brailsford Bright, of Liverpool, gentleman. Improvements in communicating signals by electricity, and in the apparatuses employed therein.

56. William Parsons, of Pratt-street, Old Lambeth, manufacturing engineer. Improvements in apparatus for supplying water to, and for preventing explosions of, steam-boilers.

58. Jean Baptiste Amédée Couder, of Paris, artist. Improvements in shawls.

PATENT APPLIED FOR WITH COMPLETE SPECIFICATION.

70. Marc Antoine François Mennons, of Rue de l'Echiquier, Paris. Certain improvements in gas retorts. A communication. Dated January 16, 1858.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," January* 26, 1858.)

2387. R. Shiers, jun. Improvements in the manufacture of velvets.

2397. R. Wicks. Improvements in furnaces.

2399. A. and C. Seward. An improved boiler for heating and keeping up circulation in water.

2402. J. H. Winder. Improvements in rotary steam engines and pumps.

2411. I. L. Pulvermacher. Improvements in apparatuses for creating electric currents, chiefly for medical purposes.

2417. J. M. Munro, jun. An improved metal wheel-stock.

2420. C. Delevante. Improvements in bouquet holders.

2425. T. Wilson. An improved boot and shoe-cleaning apparatus.

2426. D. Lichtenstadt. Improvements in the manufacture of pulp, of which paper and other fabrics are composed.

2428. G. E. Dering. Improvements in laying down electric telegraph cables, in obtaining soundings, and in ascertaining the position of and raising submerged electric telegraph cables and other bodies.

2435. M. R. Leverson. Improvements in the preparation of food for cattle. A communication.

2436. F. Cavalerie. Improvements in motive power engines.

2439. W. H. Peake. Improvements in the construction of beams, girders, and bridges.

2442. J. Minnitt. An improvement in extracting grease from animal refuse resulting from the manufacture of glue and from fellmongers' processes.

2448. E. B. West. Improvements in the manner of preparing and applying materials used in brewing to that purpose, and in the various processes and apparatus used in connexion with the same, and for novel apparatus connected with the same. A communication.

2453. M. Theiler. A direct printing telegraph without relais and local battery. A communication.

2457. H. Hughes. Improvements in machinery for cutting, embossing, and stamping.

2463. F. C. Bakewell. Improvements in the preparation for use of caustic alkalies. A communication.

2471. A. V. A. Laugère. Improvements in windmills.

2474. J. Barber. Improvements in machinery or apparatus for manufacturing rollers or cylinders used for printing and embossing woven fabrics, paper, leather, and other materials.

2517. W. Henderson. Improvements in treating certain ores and alloys and in obtaining products therefrom and in recovering or reproducing all or part of the materials used.

2523. J. M. Napier. Improvements in printing machines.

2541. W. E. Newton. Certain improvements in machinery for making mould candles. A communication.

2603. H. Edwards. An improved vessel or feeder for administering food and medicines.

2633. G. Rhodes. A parabolical or bell-shaped or other shaped camp or field tent without any centre support or pole.

2724. R. Urie and W. Sutherland. Improvements in the manufacture of knitted and weft-netted warp fabrics.

2841. J. T. Way. Improvements in obtaining light by electricity.

2850. A. J. Davis. A protective sandal for bathers, which may also be adapted as an auxiliary for swimmers.

2929. S. Riley. An improvement in the preparation of chocolate and cocoa.

3066. C. Cowper. Improvements in photography. A communication.

3107. J. B. Howell and J. Shortridge. An improved mode of rolling steel for springs.

3113. J. M. Napier. Improvements in letter-press printing machines.

3131. F. Taylor. Improvements in closets or privies.

3145. G. Bridge and J. Hamer. A new process or manufacture for converting woven silken fabrics, or silk waste, into a fibrous material fit for being spun into yarn or thread, or for being mixed with silk, woollen, cotton, or any other material, to be spun into yarn or thread; and of improvements in machinery to be employed in such process or manufacture.

3175. J. Cottrill. Improvements in the manufacture of certain descriptions of needles.

3177. I. Holden. Improvements in preparing and combing wool and other fibres.

3185. F. O. Ward. Improvements in liberating or producing potash or soda, or both (as the case may be), from natural alcaliferous silicates, the residuum of the process being available as a material for manure, puzzolano, or hydraulic cement. Partly a communication.

3195. H. Hanson. Improvements in the manufacture and finish of cotton-band, twine, rope, cordage, and other fibrous substances, and in machinery or apparatus employed therein.

23. M. L. J. Lavater. The application of the principle of exhausting air as used in plate-holders, breast-pumps for pegs.

29. R. and J. Philp. An improvement in propellors for propelling ships, boats, and other vessels in water.

32. S. Lees. Improvements in the manufacture of mineral oil.

37. T. Greenwood and J. Batley. Improvements in machinery for heckling flax and other fibrous materials.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

170. William Kilgour.
173. Frederic Prince.
181. Charles William Tupper.
182. John Livesey.
187. Barnett Samuel.
196. John Lamacraft.
200. Joseph Leese, jun.
227. David Moline.

LIST OF SEALED PATENTS.

Sealed January 22d, 1858.

1744. Christopher Dicran Seropyan.
2022. William Deakin and William Phillips.
2024. Charles Fréderic Vasserot.
2026. Edward Wilson.
2028. Joseph Needham.
2033. John Scott Collins.
2040. Richard Archibald Brooman.
2050. William Stettinius Clark.
2094. Guillaume Félix Aroux.
2154. William Alexander Clarke.
2164. John Parkinson.
2394. Thomas Robson.
2432. Henry Bessemer.
2576. William MacNaught and William MacNaught.
2652. Lucien Arbel.
2808. Henry Bessemer.
2832. Alexander Parkes.
2840. Alexander Parkes.
2890. Emile Alcan.
2898. Charles Wye Williams.
2930. Walter McFarlane.

Sealed January 26th, 1858.

2038. William Blake Williamson.
2045. Benjamin Richardson.
2051. Edward Hallen.
2058. Edward William Baxter.
2060. Pierre Alexis Francisse Bobœuf.
2063. John Bethell.
2069. William George Plunkett.
2076. Thomas Ivory.
2079. James Alfred Limbert.
2091. William Jewett Harris.
2096. Edwin Maw.
2113. William Colborne Cambridge.
2116. Sebastien Botturi.
2117. Sebastien Botturi.
2121. Sebastien Botturi.
2178. Hubert Pirotte.
2224. John Dauglish.
2260. Alfred Vincent Newton.
2269. Alfred Vincent Newton.
2843. Henry Critchett Bartlett.
2882. George Tomlinson Bousfield.
2901. Henry Davis Pochin and James Woolley.
3023. Frederick Oldfield Ward.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Dates of Registration.	Nos. in the Register.	Proprietors' Names.	Addresses.	Subjects of Design.
Dec. 28	4037	G. Dowler	Birmingham	Anti-corrosive Inkstand.
29	4038	D. Prosser	Harescomb, Gloucestershire	Pig Trough.
,,	4039	Dent, Allcroft, & Co.	Wood-street	London Shirt Front.
1858.				
Jan. 4	4040	J. Cartwright	Shrewsbury	Bar for Chain Harrows.
5	4041	J. Faulkner	St. Martin's-le-Grand	Paper File.
6	4042	W. J. Salmon	Fenchurch-street	Calosynthetic Stereoscope.
9	4043	J. Gordon	Fenchurch-street	Shovel Hoe.
16	4044	E. Page	Birmingham	Shirt and Glove Link.

Jan. 21	4045	W. Bartlett and Sons	Redditch	Needle Envelope.
22	4046	G. F. Morrell	Fleet-street	Rule, Pencil, and Penholder combined.
23	4047	W. Tonks and Sons	Birmingham	Casement Stay.

PROVISIONAL REGISTRATIONS.

1857.				
Dec. 23	946	M. Feetham and Co.	Clifford-street	Frost Tip for Horse Shoes.
30	947	J. Leighton	Brewer-street	Chimney Cap.
,,	948	J. G. Barnes	Rheidol-street, Islington	Watch Protector.
1858.				
Jan. 4	949	C. Watts	Great Western Railway	Cart Pulley Tail.
9	950	H. Neville	Lamb-fields, Bethnal-green	Tap.
15	951	M. Lyons	Birmingham	Tag or Fastener.
,,	952	E. Timmins	Birmingham	Eye Piece for viewing Pictures.
19	953	A. A. Burton	Wych-street	Lever Stud Buttons.
21	954	D. S. Brown	Old Kent-road	Kaleidoscope.

NOTICES TO CORRESPONDENTS.

J. Lawrence.—As we gave our reasons for considering your criticism respecting the Lancaster guns unfair, our readers are capable of judging whether you or we are correct. We cannot prolong the discussion upon the point.

The communication of "S." on the yacht *Julia;* "Y." on the Cholera Cure; General Thompson on Pianoforte Wires; J. De la Haye on the Screw and Paddle-wheel, with others, will receive early insertion.

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- Fox ... Music Scale ... 111
- Gatti ... Artificial Flowers ... 111
- Stanley ... Cranes ... 111
- Wiley ... Pencils ... 111
- Leslie ... Ventilating ... 111
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- Petiet ... Railway Breaks ... 112
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- Pitman ... Curry-combs ... 112
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- Geyelin ... Spring Laths ... 113
- Hood ... Charcoal Filter ... 113
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- Semple ... Pipe-tube ... 113
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Mechanics' Magazine.

No. 1800.] SATURDAY, FEBRUARY 6, 1858. [Price 3d.

Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London.

MESSRS. BARTON AND SON'S PATENT SHAPING, PLANING, AND SLOTTING MACHINE.

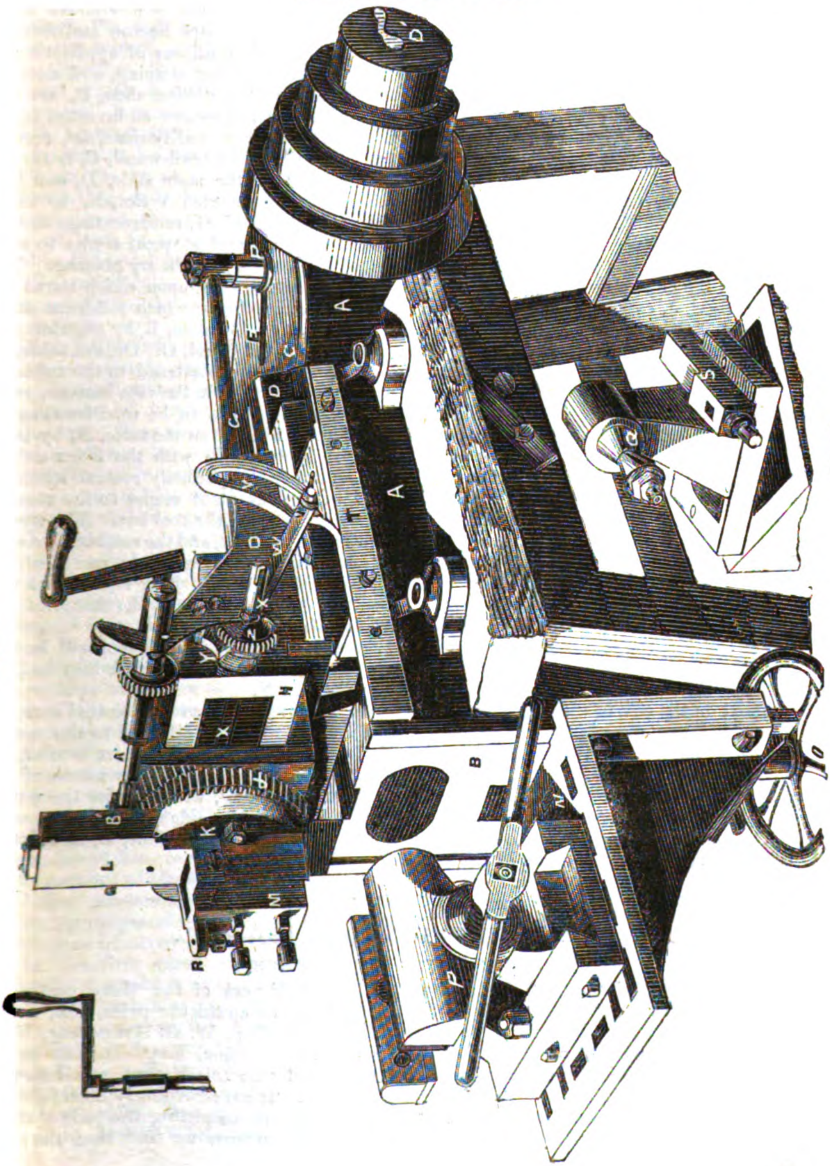


Fig. 1.

Fig. 2.

MESSRS. BARTON AND SON'S PATENT SHAPING, PLANING, AND SLOTTING MACHINE.

THE extended substitution of machinery in place of manual labour, and the consequent accurateness and rapidity of execution requisite in the manufacture of machinery, have led to the production of many ingenious mechanical tools, and foremost amongst them stands the shaping machine,—one of the most valuable aids to the engineer and machinist. Its peculiar object is the production of those parts most difficult of execution by hand labour, and, considered financially, its value is very great. Any additional improvement in this most valuable tool must therefore be received with pleasure by mechanical men. The subject of the illustrations on the preceding page, by Messrs. Barton and Son, of Derby, is of this character, combining great simplicity with readiness of application to various classes of work. The design of it is to combine a planing, shaping, and slotting machine. Fig. 1 is a perspective view. The bed, A, and the vertical slide, B, are one casting. At the end of the bed, A, a circular recess is bored to receive an inverted bevil-wheel, C, which is driven by a pinion keyed on the end of the cone pulley shaft, D′, carried by a long bearing cast on the side of the bed, A. The top of the bevil-wheel, C, is turned flat and flush with the top of the machine bed, A, so that the main slide, D, can pass over it. Across the top of the bevil-wheel, C, is cast an inverted V slot, E, to carry the nut and stud, F, from which, by means of a connecting rod, G, reciprocating motion is given to the slide, D. Cast on the end of the slide, D, and at right angles to it, is the horizontal cross slide, H, upon which the tool box moves in ordinary planing. The saddle of the cross slide, I, has on the front side a central stud upon which turns the worm-wheel, J, cast to which are the bevil side pieces, K, between which the front slide, L, and tool box, M, are fixed. The table, N, is secured to the slide, B, by angular side pieces, and is raised or lowered by means of a screw and hand wheel, O. On the table, N, may be fixed the parallel vice, P, as shown in sketch. The vice is fastened to the table by V headed bolts, which work in a corresponding groove turned in the vice bottom, so as to allow the jaws to be set at any angle. When the machine is to be used for shaping bosses, the casting carrying the cone mandril, Q, Fig. 2, is fixed on the table, N, by bolts and steady pins. The table is moved until the top corresponds with the index on the angle of the vertical slide, B, the cone mandril will then be perfectly central with the worm-wheel, J. The tool box, M, is lifted and secured at right angles to the vertical slide, D, by a bolt through a projection, R, cast on the top of the tool box. The strong wrought-iron toolholder, S, fig. 2, is then fastened in the tool box, and the machine is ready. In shaping external curves, the necessary motion to the tool is given by means of the worm and worm-wheel, J. For shaping internal curves the work (either held in the vice or on the cone mandril) must be lowered until the distance between the centre of the worm-wheel and the work corresponds to the radius of the circle required.

For slotting, the tool box, M, is held as for shaping, when the slotting tool will be in a line with the working slide, D, as in an ordinary slotting machine. The work may be held either in the vice or on an angle plate bolted on the table, N.

Fixed on the side of the bed, A, is a bar of iron, T, carrying a moveable slotted cam, U, into which, as the working slide, D, moves, runs a small roller, V, attached to the end of the bell-crank lever, W, axled on the end of the screw, X. On the short arm of the lever, W, is carried a double pall, Y, which gives motion to the screw, X, by means of the pinion, Z, keyed thereon. A similar motion is on the shaft, A′, which carries the worm, B′. The motion is reversed by throwing the pall to the contrary side of the pinion.

The handle is shown detached from the upper part of the front slide, L, in order to bring the cut within the limits of our space.

STEAM BOILER FURNACES AND FUEL.

AWARD OF THE 500*l*. PREMIUM.

AT page 464 of our 62d Volume we announced that the Steam-Coal Collieries' Association had offered a reward of 500*l*. for an effectual method of preventing the emission of smoke from multi-tubular boilers, and laid before our readers the conditions of the reward. At page 321 of our last volume (Vol. 67), we published the first Report of the three gentlemen appointed to award the prize, viz., J. A. Longridge, Esq., W. G. Armstrong, Esq., and T. Richardson, Esq. It will be remembered that this Report was but preliminary. It has accordingly been followed by two others completing the judges' statement. From these we find that the prize

has been awarded to Mr. Charles Wye Williams, of Liverpool,—a result which will be learnt with unalloyed satisfaction by every one capable of appreciating the great skill and ardour with which that gentleman has prosecuted researches and effected improvements in all that relates to the combustion of fuel in furnaces. He has undoubtedly taught most, if not all, of us—whether engineers or writers on engineering—the best part of what we know upon the subject, and it is extremely pleasing, therefore, to find him reaping the honour which is justly his due: we say "honour" because, although he has evidently been at great and constant expense in the matter, he has munificently left the 500*l.* in the hands of the Association for "promoting and disseminating practical knowledge on the generation and application of heat, in connexion with the use of coal in the boiler furnaces of steam vessels."

We cannot give the Reports in detail, but condense the following information from them.

The judges before mentioned did not fix upon any specific amount of fire grate surface, but left each competitor to adopt such amount as he deemed best suited to his own plan. They also furnished each competitor whose plan was tried with a drawing of the boiler used, and requested him to arrange the details according to his own judgment, and to be present at, and take the entire charge of, the experiments by the result of which his plan was to be judged. With the object of securing to all parties perfect equality, the whole of the coal used was obtained from the same colliery, and supplied in its ordinary state for shipment. The conditions previously fixed upon were, as we have said, given at p. 464 of the 62d Vol. of the *Mechanics' Magazine*. In all the experiments the details were carefully registered; the whole of the coals weighed and water measured. The weights of ashes, cinders, and clinkers which were left were weighed. Diagrams of the temperature of the escaping gases obtained by a pyrometer; and a number of other particulars recorded. The total number of plans submitted was 103.

Before proceeding with the results of the trials, the judges offer some remarks upon the principles involved in the various systems.

In the first place, they remark that absence of smoke is no sign of perfect combustion. Invisible gases may be passing away unconsumed for want of oxygen. Practically, whenever the air is supplied solely through the bars, this result, or the production of visible smoke, will ensue. Some maintain that *cold* air should be admitted, whilst others hold that the air should be previously *heated*. The judges do not discuss this question, but simply state their conviction that the advantage (if any) resulting from previous heating of the air is attended with such practical inconveniences as lead them to give a decided preference to the former. They further observe that the mere passing of the gases unmixed with air through a mass of incandescent fuel will not destroy the smoke, or if they be so mixed, still, in passing through the fuel, carbonic oxide will generally be formed, and thus a loss of heat will be evolved although visible smoke be prevented. This is attempted to be met, in some cases, by the introduction of fresh air to the gases after passing through the fire. There is, moreover, say they, a very serious objection to many of the plans of this class which does not seem to have had due weight with the projectors, viz., the destructive action of the flame and heated gases upon the bars which support the fire through which they are passed. In some cases it is supposed that this will be obviated by using hollow bars through which a current of air is passed. This would prove utterly inefficient. In other cases it is proposed to make the bars of tubes filled with water, and thus forming part of the heating surface of the boiler. This involves considerable practical difficulties in the construction, and particularly in any repairs which may be needed; and they consider these difficulties to be of sufficient magnitude to render it highly injudicious to adapt such a system in marine boilers, where the failure of one of these tubular bars during the voyage might render the boiler entirely useless. The introduction of steam with air into the furnace they think wrong in principle, because the mere action of heat will not decompose steam, and even if it would, it is difficult to understand how any advantage could be gained by the hydrogen of the steam parting with its own oxygen simply to take up the same amount from the air which is introduced along with it.

After full consideration, they selected for trial the plans of Messrs. Hobson and Hopkinson, Huddersfield; Mr. C. W. Williams, Liverpool; Mr. B. Stoney, Dublin; and Mr. Robson, of South Shields: acquainting the remaining competitors that they were ready to submit their plans also for trial if they desired it, in conformity with the fifth paragraph of the original advertisement. None of these parties, however, availed themselves of the opportunity thus given of testing their plans at their own expense.

The first plan submitted for trial was

that of Mr. Robson, of Shields. The principle of this plan is to divide the furnace into two fire-grates, the one at the back being shorter than the other, and at a lower level. This back grate is furnished with a regular door frame and door, for enabling the stoker to clean the bars and remove the clinker when required. This door is also provided with an aperture fitted with a throttle valve, and in the inside a distributing box perforated with half-inch holes, after the manner practised by Mr. C. Wye Williams. The front grate is like the ordinary fire-grate, but without any bridge. The mode of proceeding is to throw all the fresh coal upon the front grate, and to keep the back or lower grate supplied with cinders, or partially coked coal, which is pushed on to it from time to time from the upper or front grate. No air is admitted at the door of the upper grate, but the gases arising from it meet with the current of fresh air admitted through the door of the lower grate, and in passing over the bright fire upon it are to a greater or less degree consumed. With respect to absence of smoke, they report this plan only partially successful. It requires careful and minute attention from the stoker, otherwise a good deal of smoke at times appears, particularly when fresh fuel is pushed from the upper to the lower grate.

It appears that though there was an increase of economic value of fuel with this plan, there was a loss of work done by the boiler, and this although the fire-grate was greater by four square feet, or 14 per cent., than in the standard furnace. Owing to the large admission of air at the fire-door of the back grate requisite to prevent smoke, the fuel on the front grate burns sluggishly, and hence the falling off in the rate of combustion and the work done. The very intense heat in the back grate would also be more injurious to the boiler and the tubes than the more equally distributed temperature which results from the ordinary description of fire-grate.

The next plan tried was that of Messrs. Hobson and Hopkinson. In this system air is admitted both at the doors and at the bridge. At the doors by vertical slits, which may be opened or shut at will by a sliding shutter; and at the bridge through apertures in hollow brick pillars placed immediately behind it. The entrance of the air to these pillars is regulated by throttle valves, worked by a lever in the ash-pit. There are also masses of brickwork placed in the flame-chamber, with the intention partly of deflecting the currents of gases, so as to ensure their mixture with the air, and partly to equalize the temperature. As regards prevention of smoke, that this plan was very efficient, though in hard firing it required considerable attention from the stoker. The only objection to this system is that the brickwork is liable to crack and get out of repair; but the judges do not attach much importance to this, as they believe that the existence of this brickwork is of no consequence, and that the results obtained are due simply to the admission of air to the gases. The system is applicable, they say, to all the usual forms of boilers; the combustion is very good, and, with moderate firing, it does not much depend upon the stoker. They are therefore of opinion that it complies with all the prescribed conditions.

The next plan tried was that of Mr. C. Wye Williams, of Liverpool. Mr. Williams' system, as is well known, consists in the admission of air at the furnace door, or at the bridge, or at both, by numerous small apertures, with the intention of diffusing it in streams and jets amongst the gases. In the plan adopted in the present instance, Mr. Williams introduces the air only at the front of the furnace, by means of cast iron casings, furnished on the outside with apertures provided with shutters so as to vary the area at will, and perforated in the inside with a great number of half-inch holes. The mode of firing which Mr. Williams adopts merely consists in applying the fresh fuel alternately at opposite sides of the furnace so as to leave one side bright whilst the other is black. The results obtained with this show a large increase above the standard in every respect. The prevention of smoke was, we may say, practically perfect, whether the fuel burned was 15lbs. or 27lbs. per square foot per hour. Indeed in one experiment the extraordinary quantity of $37\frac{1}{2}$lbs. of coal per square foot per hour was burned upon a grate of $15\frac{1}{2}$ square feet, giving a rate of evaporation of $5\frac{1}{2}$ cubic feet of water per hour per square foot of fire grate, without producing smoke. No particular attention was required from the stoker; in fact in this respect the system leaves nothing to desire, and the actual labour is even less than that of the ordinary mode of firing. Mr. Williams' system is applicable to all descriptions of marine boilers, and its extreme simplicity is a great point in its favour. It fully complies with all the prescribed conditions.

The next and last plan submitted to trial was that of Mr. B. Stoney. In principle, so far as regards the prevention of smoke by the admission of air through the doors and at the front of the furnace, this plan is identical with that of Mr. Williams'. Its

peculiarity consists in the adoption of a shelf outside the boiler, forming, in fact, a continuation of the dead plate outwards. Upon this shelf the fresh charge of coals is laid in a large heap, about half of the heap being within the furnace, and the rest outside. The door is a sliding frame, which shuts down upon the top of this heap of coals, so that air is admitted through the body of the coals as well as through perforations in the front plate of the furnace. When the furnace requires fresh fuel, a portion of that forming the heap, and which, to some extent, has parted with its gases, is pushed forward, and its place made up by fresh fuel laid on in front. This plan did not succeed in preventing smoke, for whenever the coal was pushed forward upon the fire, dense smoke was evolved.

With the above results before them, the judges are unanimously of opinion that Mr. Williams must be declared the successful competitor, and they therefore award to him the premium of 500*l.*

In the judges' Report, dated 25th August last,* they drew attention to certain results obtained in the course of their experiments, showing that the evaporative power of the coal of the Newcastle district is much beyond what is usually attributed to it, and stated that this fact might serve to correct an error of opinion which has resulted from the published Reports on coals suited to the steam navy, with the high sanction of the names of Sir H. de la Beche and Dr. Lyon Playfair. The coals upon which Dr. Lyon Playfair and his colleague made their experiments included those from the collieries called respectively West Hartley Colliery and Aberaman Merthyr, the former representing an average quality of the North Country Steam Coal, and the latter the best Welsh. The results arrived at as regards the relative calorific values of these coals were as follows:—

Aberaman Merthyr	10·75
West Hartley	7·87

In a letter published in the *Mechanics' Magazine* for Oct. 24, 1857 (No. 1785, Vol. 67), Dr. Playfair, while not attempting to impugn the judges' results, explains their discordance with those obtained by himself and Sir H. de la Beche, by affirming that they did not profess to give the *absolute* values of the coals tried, but only their *relative* values under like conditions of experiment. He further states, that attention was drawn to the unfitness of the small Cornish boiler used, to give *absolute* results, and he adds, that he would not be surprised to learn that it was fifty per cent. below a multitubular boiler.

* See *Mechanics' Magazine*, Vol. 67, p. 321.

This explanation of Dr. Playfair's is discussed in the third Report of the judges. It appears to imply, say they, that, "although the figures given in the Reports do not express *absolute* calorific effects, they correctly indicate the *relative* values of the respective coals. But this conclusion, which is at direct variance with our results, appears to be completely vitiated by the fact admitted by Dr. Playfair, that instead of treating each kind of coal in the manner most favourable to the development of its powers, they based their determinations '*upon like conditions of experiment*' applied indiscriminately to both. Had the experiments been made with a proper marine boiler, instead of 'a small Cornish boiler'—if a complete apparatus such as we employed had been used, and if the conditions necessary to effect perfect combustion of each kind of coal had been investigated and applied—we have no doubt that their results would have agreed with ours; but, as it is, we submit that our own more careful deductions are entitled to preference." The judges then institute comparisons between the Welsh and the Hartley coal, and contend that the latter is in no respect inferior to the former for consumption in steam boilers.

MOY'S PATENT EXPANSION STEAM ENGINE.

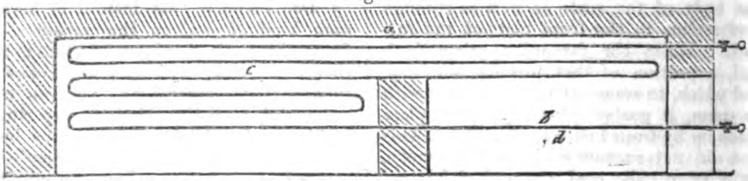
Numerous patents have from time to time been obtained for heating water and generating steam in externally heated tubes; and, at the first glance, this engine of Mr. Moy's, which has been recently patented, and which was described at the Dublin Meeting of the British Association,* may appear to belong to that class; but it is essentially different. In this case the water is heated in tubes of small diameter, but *steam is not generated therein;* the formation of steam *in* the tube is prevented by keeping the tubes *filled* with water. The heated water is kept in constant circulation on the well-known system called Perkins' system. The steam cylinders, in which the highly-heated water expands into steam, are provided with jackets, either cellular or otherwise, and the whole is so arranged that the heated water passes from the hottest end of the boiler tube to the valve box, from the valve box to the jacket, and from the jacket by the return tube returning to the boiler. Attached to this return tube is the feed pipe. The cylinders may be placed in any convenient position, above, below, or level with the boiler, and vertical, horizontal, or otherwise. The valves are so formed

* See *Mechanics' Magazine*, Vol. 67, No. 1703, p. 343.

that the attendant can regulate the quantity of water supplied to the cylinder according to the required power, and this while the engine is in motion; and, by entirely closing the regulators, the engine is stopped. The exhaust steam may pass into a surface condenser, whether the engine is of the marine, locomotive, or stationary class, for the purpose of using the condensed water over again. It will be seen that this engine is designed to carry out expansion to nearly its utmost limits.

By the aid of the accompanying engravings the engine will be clearly understood. Figs 1 and 2 show an arrangement for a boiler composed of a series of tubes

Fig. 1.



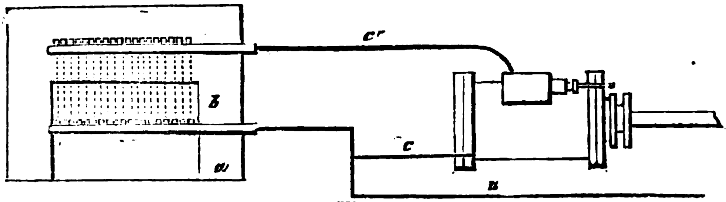


Fig. 2.

with taps at each end of each tube, so that in case of need any particular tube can be shut off without stopping the working of the boiler. *a*, is the brickwork in which the boiler is set; *b*, is the furnace; *c*, the tube or boiler; *d*, the bars which are tubular, and form part of the water tubes or boiler. The bearers for the tubes are not shown.

Another form of boiler is described in the patentee's specification, called a *continuous tube boiler*, but the modifications are obviously so numerous that the above is sufficient for the purpose of showing the principle.

Fig. 2 also shows one mode of connecting the boiler with the engine, c'', being the hottest end of the tube, and, c', the return tube.

For marine boilers the walls may be formed of double plates of iron, with space between the plates to allow cold water to enter from outside the vessel; the boilers being entirely below the load water line, an open pipe to the bottom of the shell of the boilers from the outside, and another open pipe from the top to the outside, will keep the external part of the boilers cool and prevent accidents from fire. The cold water may be made to pass the surface condenser before entering the shell of the boilers.

Fig. 3 represents (on a larger scale) a mode of working the force pump for sup-

Fig. 3.

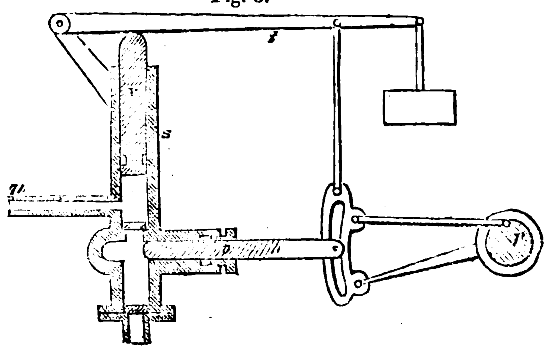
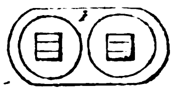


Fig. 6.



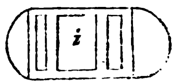


Fig. 7.

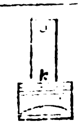


Fig. 8.

plying the water to the boiler, to compensate for the quantity withdrawn by the valves; *o*, is the plunger of an ordinary force pump, which is worked with a modification of the ordinary link motion employed in locomotive engines from the shaft, *p*, motion is communicated to the upper end of the link by a pin on the end of the shaft, but the lower end of the link has no motion, as it is attached to a concentric ring on the shaft. The pin on the end of the plunger rod being, as shown in the figure, in or about the centre of the curved slot, the plunger will be worked at a medium length of stroke; *r*, is a vertical plunger or plug in the barrel, *s*, which, as it rises or falls therein according to the quantity of water, will raise or lower the properly weighted lever, *t*, and with it the link, thereby causing the pin of the plunger rod, *o*, to occupy a lower or higher position in the curved slot, and in this manner to regulate the action of the plunger; when the pin is at the upper end of the slot, working the plunger at the full length of stroke, and when it is at the lower end ceasing to work the same. *u*, is the feed pipe leading to the boiler.

Figs. 4 to 12, inclusive, represent two forms and constructions of slide valves and apparatuses for regulating the admission of the highly heated water from the boiler to the cylinder in the manner required, so as to allow a suitable quantity to pass into the cylinder at the commencement of each stroke of the piston. Fig. 4 is a section representing a regulating slide valve at full work, or with the parts arranged to admit the greatest quantity of heated water to the cylinder at each stroke; *h*, is the valve-box; *i*, the regulating slide valve; *j*, the valve rod; *k*, *k*, pistons, to regulate the quantity of water passed into the cylinder; *z*, *z*, rods by means of which the pistons are moved into their required position in the valve: *m*, *m*, are the passages to the cylinder; and *n* is the eduction passage. It will be seen on reference to the figure that the heated water from the boiler, having free admission to the valve-box, *h*, will enter and fill the divisions or chambers of the valve alternately, as indicated by the right-hand arrow; and the divisions or chambers will alternately discharge their contents of heated water into the passages, *m*, as indicated by the left-hand arrow: the working of the slide valve changing the passages in the ordinary manner.

Fig. 5 represents the regulating slide valve, *i*, closed against the admission of

Fig. 4.

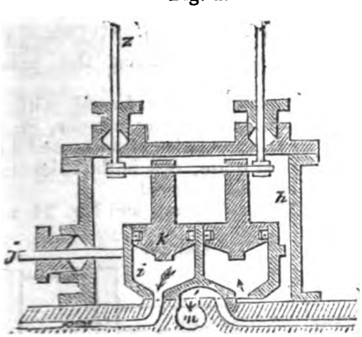
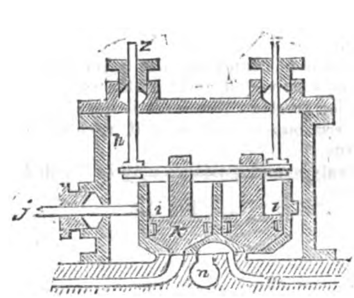


Fig. 5.



any heated water from the valve-box, *h*, by the pistons, *k*, *k*, having been moved into the position shown in the figure.

Fig. 6 is a plan or horizontal view of the valve, *i*.

Fig. 7 is a view of the same as seen from the under side.

Fig. 8 shows one of the pistons, *k*, detached.

Fig. 9 is a section representing another form and construction of slide-valve and regulating apparatus, in which the regulators are fixed and cast in one block with the eduction passage. *h*, is the valve-box, *i*, the slide-valve, *i'*, *i'*, are the regulators, *k*, *k*, are the regulating pistons. In this figure the apparatus is shown at full work. The division or chamber, *i'*, on the right hand being open to receive the heated water from the valve-box, *h*, and the division or chamber, *i'*, on the left hand being in open communication with one of the passages, *m*, leading to the cylinder. The communications are changed by the sliding of the

valve, *i*, over the ports in the ordinary manner.

Fig. 10 is a similar section, showing the pistons, *k*, *k*, moved so as to close the two divisions or chambers, *i'*, *i'*, of the regulator.

Fig. 9.

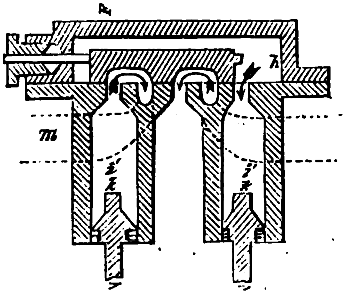


Fig. 10.

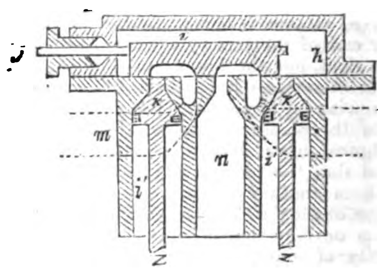


Fig. 11 is a partial section at right angles to Fig. 9 on the line E F.

Fig. 12 represents the ports. *i'*, *i'*, are those leading into the divisions or chambers of the regulators, *m*, *m*, are those leading to the cylinder, and *n* is that for the eduction passage.

Fig. 11.

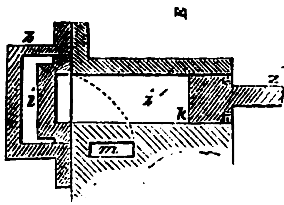


Fig. 15.

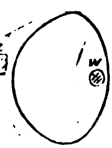
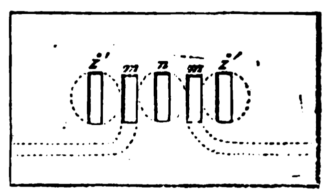


Fig. 12.



The mode of connecting the boiler to the engine may be varied, and for this reason as well as for greater clearness it is not shown in the sections of valves and regulating apparatus.

The valves and passages may be divided and placed at each end of the cylinder if preferred, thereby making the passages shorter.

The jacket may be formed with one chamber in the ordinary manner, or with cells for the circulation of the heated water, but a spiral worm, cast in the thickness of the cylinder, is preferred.

Fig. 13 is a diagram, and Fig. 14 a plan or horizontal view, representing a mode of communicating motion from single-acting steam-pistons to the working shaft of an engine; *v*, *v*, *v*, are disc-wheels connected to

Fig. 13.

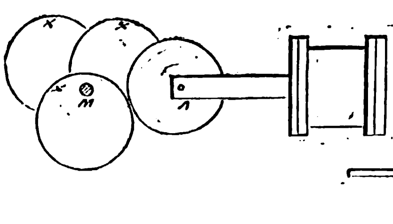
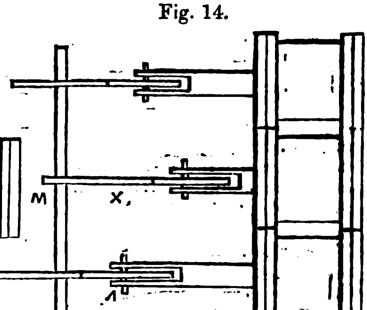


Fig. 14.



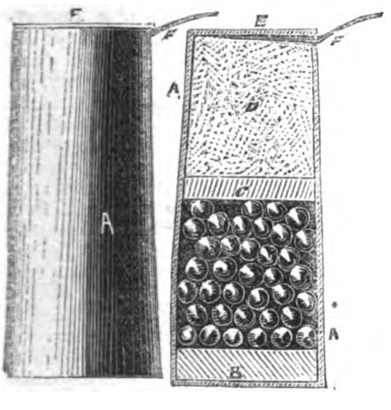
the respective piston-rods, *w*, is the working-shaft, on which are fixed, as eccentrics, similar disc-wheels, *x*, *x*, *x*, so as to be in contact with the wheels, *v*, *v*, *v*. By this means the outward motion of the several piston-rods will, by their action on the several eccentrics in succession, impart a rotary motion to the shaft; the eccentrics, as they are made to revolve, forcing the pistons back again. By the use of this plan a screw-propeller shaft can be disconnected by merely shutting the regulators.

Fig. 15 represents a form of eccentric which may be preferred to the circular form, as, with this form, the shaft will perform one-fourth of a revolution while the piston is performing about a third of the stroke—being equivalent to an expansive engine working a crank which gradually increases its length during the stroke.

SIR H. STRACEY'S PATENT RACKHEATH CARTRIDGE.

Sir Henry Stracey, Bart., of Rackheath Hall, Norwich, has obtained Provisional Protection for a cartridge which, by a very simple contrivance, gets rid of the necessity of biting off the end,—a proceeding which is always objectionable, and which, in the case of the "greased cartridges" of the Bengal army, offered an occasion for the present disastrous mutiny in India. But the main object of Sir Henry—who is an experienced sportsman—in making his improvement, was to increase the rapidity of loading, an object of the first importance in both field and covert sport, as well as

Fig. 1. Fig. 2.



n military operations. And this end is so well attained by the improvement, that experienced loaders, who have given it a practical trial, find they can load an ordinary piece with the new "Rackheath Cartridge" as rapidly as they can load even the best breech-loading arms. The characteristic feature of the improvement consists in the cartridge being supplied with a small projecting piece of tape, or other similar material, the tearing off of which removes the end of the cartridge, and exposes the powder. The improvement is equally applicable to small-shot and to bullet cartridges.

The "Rackheath Cartridge" is represented in elevation in fig. 1, and in section, in fig. 2, and is constructed as follows:—

The maker first forms a tube, A, in paper of about the length of the intended cartridge and closes one end over an ordinary gun-wad, B, by gumming down the edges of the paper thereon. He then introduces the charge of shot, and covers the shot with another gun-wad, C; then introduces the powder, D, turns down the edges of the still open end of the paper tube, A, and gums or pastes thereon a disc or cover of paper, E, to the underside of which a piece of tape, or other like material, F, has been previously attached. When the cartridge is complete the piece of tape projects beyond the tube. To load,—tear away the paper disc, E, by pulling up the tape, F; the powder will thus be exposed, and the cartridge being placed into and rammed down in the barrel, sufficient powder will be forced into the nipple to ensure the firing of the charge upon the explosion of a cap in the ordinary manner.

THE LAUNCH OF THE "LEVIATHAN."

The "Leviathan," after numerous additional applications of the hydraulic presses which we have not taken the trouble to record, was floated on Sunday last. The only notable circumstance we have remarked in connexion with the event—beside the intrinsic importance of the result—is the fact that certain newspapers announced it as *the completion of Mr. Brunel's "victory."* We fear Mr. Brunel will be more likely to smart under this as satire than accept it as praise. Mr. Brunel spends three months in effecting, by almost brute-force, what nine ship-builders out of ten would have accomplished scientifically in a few hours, and thus wins "a victory"! The only thing he appears to us to have conquered is the common sense of the individuals who write such nonsense. We need hardly say that the ultimate floating of the ship affords us unfeigned satisfac-

tion, and the fact of her having escaped with but little injury from Mr. Brunel's perilous experiment proves her to be of unparalleled strength.

HENRY CORT AND HIS DESCENDANTS.

The history of Henry Cort's improvements in the manufacture of iron, and of the transactions which led to the impoverishment and premature decease of that meritorious inventor, has been so fully recorded in these columns, that our readers must be well-informed upon the subject. We think it desirable, however, to state in a few words the present circumstances of the movement made on behalf of his son and daughters. It is not generally known that twenty-five eminent gentlemen, all high scientific and practical authorities, signed a memorial to Lord Palmerston, which was presented last year by Lord Stanley, and supported by upwards of sixty Members of Parliament, praying his Lordship to institute inquiry into the merits of the case. This memorial represents the value of Henry Cort's inventions to the nation as at least 600,000,000*l*. sterling, derived from British labour, and the greater part from materials previously valueless. Lord Stanley will, in all probability, resume his advocacy of the case in the ensuing session of Parliament. But the unavoidable delay which has occurred has, we regret to say, involved Mr. Richard Cort (the only surviving son) to some extent, pecuniarily, on account of the expenses incurred in the prosecution of his efforts to secure for his sisters and himself some portion of that remuneration which, in the natural order of things, should have been theirs. Many iron masters and others have contributed liberally to the "Cort Testimonial Fund," but, as our readers are aware, the promotion of such a case involves considerable outlay, and at present Mr. R. Cort is, as we have said, involved to a certain extent; not greatly, it is true, but sufficiently to deprive him of the free use of even the trifling pension awarded him, in 1856, by Lord Palmerston —50*l*. per annum. At the same time he is just now suffering from severe illness, in which, from the causes mentioned, he is deprived, at the age of seventy-four years, of those necessaries and comforts which are so requisite under the circumstances. It is proposed, therefore, to raise 50*l*., or 100*l*. for the purpose of obviating this evil; and, remembering the magnitude of the benefits conferred upon the nation by Cort's inventions, we, in conjunction with a few of our contemporaries, insert this appeal without hesitation, and believe the amount will be at once subscribed. Subscriptions should be sent directly to Mr. R. Cort, 16, Hemingford-terrace, Caledonian-road, Islington, London, N., who will, doubtless, publish his acknowledgments in the form of a list of the subscribers.

CARRIAGE BUILDING: NOVEL AND IMPORTANT IMPROVEMENTS.

Mr. Henry Deacon has perfected some improvements which are remarkable for their departure from the generally accepted laws which influence the suspension, balancing, and draught of carriages. Mr. Deacon practically embodies his peculiar notions in a Brougham, which he terms "The Repose," at present on view at Messrs. Hale and Co.'s, Coach Makers, Mortimer-street, Cavendish-square, and which certainly presents an extremely elegant appearance, resulting from a happy combination of harmonious lines, independent of any consideration of actual fitness. But with quaintness of form, several valuable elements of utility have been secured. For instance, unexampled ease and comfort are obtained by a method of suspending the body of the carriage upon a "stationary double-acting vertical spring," —never before used, and which, in cooperation with a "step brace" on each side, permits of the centre of gravity being lowered to suit the convenience of an invalid. Thus the Elliptic spring and its uneasy motion, so much complained of, are dispensed with, while the carriage is more easily turned without that strain which arises in ordinary carriages when the off-wheel is making the round, and which, when on an incline, has occasioned many an upset. By these ingenious contrivances greatly increased steadiness and strength are obtained, which superinduce a noiseless transit, the more apparent when conversing while riding in crowded and over rudely paved thoroughfares. With this additional strength, too, immunity is secured from that absurd condition to which the common cab and Brougham are liable, that of finding themselves travelling, after any sharp concussion, hind-wheel-less. The "double action vertical springs" can be applied to any carriage, and the fore part improvement used without either the step brace or C-spring. Moreover, by the raised position of the former, a decided security is obtained in preventing injury to valuable horses, from the impossibility of their hind legs

touching any portion of the vehicle, a contingency which in the case of the Elliptic springs induces spirited animals to kick. Mr. Deacon is far from being a tyro in improvements of this description, as many of the advantages secured of late years in the build of carriages and street cabs are traceable to him, and, if our memory serves us, it was he who submitted plans to, and which were approved of by, the late Lord Lichfield, by which the draught of the mail coach and cart would have been reduced about one-fourth, and whereby some 12,000*l.* a-year would have been saved to the Post-office according to the notions of the Duke of Richmond, Mr. Johnson, the then Comptroller of Mails, and Mr. J. Mills, the Agent to the celebrated Engineer of Roads, &c., Mr. Telford. The advent of railways, however, postponed, in the conveyance of mails on common roads, alterations which are now showing themselves in other vehicles from the same experienced source.

IRON LAND AND SEA DEFENCES.

To the Editors of the Mechanics' Magazine.

Gentlemen,—As you have called my attention and that of your readers to the subject of "Iron Land Defences," by publishing an extract, in No. 1799, from a lecture "*delivered in December*, 1857, *at the Royal Engineer Establishment for Field Instruction at Chatham*," I beg the favour of being permitted to observe, that among the 400 practical drawings which I brought under your notice as stated in my letter published in number 1779 of the *Mechanics' Magazine*, will be found many designs relating to iron impregnable batteries both for land and sea purposes,—the former commencing in 1830, and the latter of a later date,—invented, as I have already remarked, for our coast and harbour defences; and, as Viscount Palmerston has lately authorised me to submit to his personal inspection such of my inventions as may be considered of service to the State, I am now engaged in making sketches from among my plans, of impregnable revolving iron redoubts, with the impression that his Lordship will find it desirable to carry them into operation for the future protection of India and our colonies; their object being the same as Martello towers, but of a more formidable and a more accommodating character for quartering troops.

I consider it right to state, all the advantages alluded to by the lecturer at Chatham, and more, are literally to be found in my iron defences, and the number of guns range from one to as many as may be required in a line, or "tier above tier," as noticed in the extract. And this is another proof, I am pleased to say, that my original thoughts on the value of iron for military purposes is responded to by professional men, experienced in its working and natural capabilities.

As I have no desire to take up more space than I can well avoid, for the present I will confine myself to a few plain facts bearing on this highly-important national question, to show how requisite it is for the Government to establish some course by which naval and ordnance improvements may be brought into use at fitting and appropriate seasons, and not kept back for the want of due consideration or other causes inimical to the country's interest. It is far from my desire to make uncalled-for remarks on this subject, but I feel that I am called upon thus to discharge my duty to Her Majesty and the State, by stating that I have been continuous in my endeavours to obtain, to no purpose, that attention which is due to national improvements such as those before us.

As they were designed expressly for public use, I offered them, together with my personal services, without stipulating for anything in return; and, at the commencement of the late war, Sir James Graham refused to avail himself of my plans, although much wanted; and his predecessor, Sir Charles Wood, also, *before* iron floating batteries of an inferior class to those invented by me were adopted as a *French invention;* and although I would have undertaken to find parties to supply the whole of the gun-boats, of a superior character, at 12*l.* per ton, they were built at an average rate of 21*l.* per ton, as my correspondence will show.

Since the iron floating batteries were built experiments were made by the War Department to test the value of 4-inch wrought-iron plates, and to see how far they could resist the impact of heavy artillery; but my suggestion to place them at an angle originally intended by me for glancing shot was also refused, as will be shown by my correspondence at the time with that branch of the public service.

In making the request to have the plate placed at a glancing inclination I thought it right to remark, that on its success depended a change in constructing the face of fortifications, as it would at once demonstrate the superiority of iron over stone; and here I beg to remark, my "Iron land defences" embrace both wrought and cast iron, which, in combination, will very considerably reduce the expense: and as the

Ordnance Department now feel inclined to entertain the principle of employing iron in the place of stone, it is to be hoped experiments will be made in such a form as will meet the merits of the subject fully.

I am, Gentlemen, yours, &c.,

JOHN POAD DRAKE.

London, February 2, 1858.

CHOLERA AND ITS PREVENTION.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—In the *Mechanics' Magazine* for Jan. 23, No. 1798, is an extract from the *Scientific American*, referring to Dr. M'Cormack's paper in your Magazine for November 14, 1857, on "The *Asiatic Cholera and Its Prevention*," in which extract it is stated that the use of acids, more especially sulphuric acid, is now common in the United States. Dr. M'Cormack having said that "the name of the person who introduced this remedy, like that of many another benefactors of his species, is unknown," the *Scientific American* asserts that "the first notice of its efficacy was given publicly by Dr. L. Reid, of the New York Hospital, during the last visitation of cholera in this city;" and hence supposed that he is the benefactor who is unknown to Dr. M'Cormack.

That this claim is unsound is clear by referring to some of the English medical journals for the year 1851, more especially to the *Lancet* (for August, 1851), which shows that the "Austrian remedy for the cholera" was *then* ordered to be used in all the armies of Austria, and that it consisted of—

Sulphuric acid	1.848 sp. gr.	19 grains.
Nitric acid ...	1.500 „	12 „
Sugar		24 „
Water		416 „

The dose was one teaspoonful with five of *cold* water, and cold water drank freely. In half-an-hour the dose was to be repeated, and so on, if the symptoms did not abate. All *warm* liquids to be avoided. It is a curious fact that the cholera does not prove virulent in *cider* countries. Y.

Jan. 26, 1858.

THE YACHT "JULIA."

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—The account in the October Part of the *Mechanics' Magazine* of the performance of the Yacht *Julia*, which is limited to a list of prizes won in smooth water during five years, scarcely bears out the assertion that "she is the most remarkable yacht that has apeared since the arrival of the *America*." It may be doubted whether any more cabin accommodation is afforded by a squarish form of section near the keel, to carry iron or lead ballast, than by the triangular addition below, which produces the peg-top section adopted at Poole; and the question may be reduced to the inquiry, whether a square or triangular form is preferable near the keel. It does not appear to be clearly stated whether the additional keel forward was added to improve the balance of the sails, or to supply the want of sufficient side resistance. The first defect could have been equally remedied by an additional cloth to the mainsail if she could have carried it; and, if not, some canvass could have been taken off the jib and added to the mainsail. The wave form of water lines had been used before 1852, more or less correctly, often without any acknowledgment of the source from whence it was derived, and sometimes even accompanied by a denial of its value. It appears to have been fully carried out in the *Julia*—a circumstance that renders her claim to superiority of interest, perhaps, to a few of your readers, and further information desirable:—Whether the full quarter produces a quarter wave; and, if so, at what speed and angle of inclination (approximately); whether the stern wave rises sooner than the bow wave, and at what speed is either produced; whether the proposed lengthening amidships is to remedy the defect of the *Julia* being found too short in proportion to her breadth, or simply to afford greater accommodation to her owner. Other known and ascertained particulars might prove of interest.

Yours obediently, S.

Jan. 6, 1858.

[Our correspondent appears not to fully understand the construction of the vessel when he says "it may be doubted whether any more cabin accommodation is afforded," the fact being that there is standing room in the cabin of the *Julia*. May we ask him what Poole vessel, of seven or eight tons, has the same? Our experience teaches us that, instead of being able to walk, dress, &c., in comfort, the yachtsman is ordinarily obliged to crawl about in a stooping position, and sit with his head thumping against the deck beams and deck. When "S." speaks of the "triangular addition below which produces the peg-top section adopted at Poole," he apparently thinks that the *Julia* draws much less water than these vessels, forgetting that her *broad keel* goes down to as great a depth as their narrow one, and that it *includes*, if we may use the expression, the peg-top section, with the advan-

tage of an immense weight of ballast on the floor and sides of the keel, fully *two feet* below the centre of gravity of the ballast in an ordinary yacht of similar tonnage, besides the additional advantage of increased cabin room. The slightly increased resistance is more than compensated by the additional propelling power she can carry aloft. The additional keel forward was added to the *Julia* to give increased lateral resistance, and power of going to windward. Her lengthening amidships was done to make her fully up to the eight tons, which she had been rated at previously, although virtually a smaller vessel. She has by no means so full a quarter as the *Mosquito* or *America*, both so celebrated for speed, and the bow wave rises sooner than the one at the quarter. In conclusion it may be said that this vessel possesses what the designer expected, and what have hitherto been thought incompatible, viz., great speed, with much greater cabin room than any vessel of her class.]—EDS. M. M.

ON THE COMBINED USE OF SCREWS AND PADDLE-WHEELS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I presume that, as the numerous experiments made with the engines of the *Great Britain* led to the adoption of short-stroke engines for propelling the screw, so the first voyage of the *Leviathan* will probably suggest numerous improvements in her machinery. I will venture to predict that, in future, arrangements will be made by means of which it will be possible to connect and disconnect the screw and paddle engines, and by so doing it will be, I believe, evident to every engineer that an important addition would be given to the speed of the ship. It is well known that, in sailing over a heavy sea, the screw is frequently entirely out of the water, or in paddle-steamers one of the paddles is almost constantly whirling in the air. In either case the engines work with fearful rapidity, causing great vibration in the vessel; while, at the same time, a large amount of power is lost. It might be supposed that the impetus attained by the rapid revolution of the screw or paddles while out of the water would cause them to propel the vessel more rapidly on being immersed. Such, however, as far as my own observations extend, is not the case. I have frequently watched the working of engines at sea during severe gales, and I have seen that the rapid working of the engines is suddenly checked by each wave striking against the screw or paddles with fearful violence. In the *Leviathan* this inconvenience will, most likely, be more severely felt than in other vessels. Her great length will tend to prevent her from rolling, and in that case both paddles will be frequently entirely out of the water. Dr. Scoresby calculated the average length of the waves in the Atlantic at 300 feet, and their average height at 45 feet. The *Leviathan* will, therefore, glide through the surface of the waves, instead of having a tendency to sink in the trough of the sea. But this, although in many respects highly favourable for rapid sailing, will cause either both the paddles or the screw to be frequently out of the water. Were all the engines connected, their combined power would be at one moment exerted on the screw, and in the next on the paddle-shaft. Such an arrangement is now impossible in the *Leviathan*, and would be difficult in any case, owing to the difference in the length of stroke in the engines, and to the shaft being placed at right angles to each other. A millwright would suggest the adoption of bevelled cog-wheels, but the machinery would be too complex, and, consequently, liable to derangement. The action must be direct. But until such an arrangement can be made, it will be perhaps more advantageous to use two sets of paddles, as the two shafts could be easily connected by means of cranks and rods. Here, however, is a field for the inventive genius of our marine engineers; and those who will succeed in effectually combining the paddle and screw engines without the aid of complicated machinery will contribute to no slight extent to the rapid circumnavigation of the globe. I remain, gentlemen,

Yours respectfully,
JOHN DE LA HAYE.

New Baily-street, Salford, Jan. 25, 1858.

THE NOAHCIC LEVIATHAN.—HOW LONG DID IT TAKE TO BUILD?

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—As the age of "big ships," *par excellence*, seems to be dawning upon us, and all the world has gone wondering after the *Leviathan*, it is interesting to look back and consider a little as to the doings of that faithful patriarch who achieved a triumph in naval architecture while yet the world was young, and who built his ark farther from the water's edge than even Brunel would have dared to have done, and yet had no difficulty as to his launching ways. Noah approved of letting the water fetch his vessel away, and, therefore, we can

derive no lesson in his case as to the prudence of putting a big ship into iron-shod cradles, and pushing them down upon a couple of gigantic gridirons.

While I would never surrender my belief in the connexion declared by revelation to exist between the iniquities of the antediluvian race of men and the waters of the deluge, I am not yet prepared to believe that Noah was aided in his great work by anything more than the ordinary and so-called laws of nature. I look upon the ark as a triumph of engineering skill, subject to one proviso; namely, that while the work was human, the plan was Divine. The command as to the structure that was to be built was by revelation; but, after all, Noah was to "build." Noah did build, and, doubtless, built well. To do this he must have sacrificed great wealth and employed skilful workmen. But a question arises—How long was the period of time thus occupied? All the books that I have referred to on this subject state the period to be either 100 or 120 years. The former period is deduced by comparing Gen. v. 32 with vii. 6, and the latter by comparing Gen. vi. 3 with 1 Pet. iii. 20. I admit the first comparison proves that the ark could not have occupied more than 100 years, but I do not admit that it proves the building of the ark occupied the whole of that time. From this deduction the second comparison becomes useless; but I may observe that the period of 120 years may mark the interval between a revelation that a deluge was impending and the actual appearance of the deluge. The command to build the ark may not have been given until long after the deluge was threatened. It would have been absurd for the ark to have been completed twenty years or more before the deluge came. But as to the actual period occupied in the construction of the ark, I beg to make what appears to be a new comparison, namely, Gen. vi. 18 and xi. 10; the former being, "Thou shalt come into the ark; thou, and thy sons, and thy wife, and thy son's wives with thee;" and it will be seen by the context that this language was used when the original command was given to build the ark. Therefore, when that command was given, Noah's three sons were old enough to be married. The second passage reads thus, "Shem was an hundred years old, and begat Arphaxad two years after the flood." From this I infer that Shem was ninety-eight years old when the flood terminated, while the former passage shows me that his youngest brother was married when the command was given to build the ark. Thus to know how much time was consumed in the building of that marvellous structure we must deduct from ninety-eight years the period of time which intervened between the birth of Noah's first-born son and the marriage of the youngest. This will fairly demand twenty or thirty years, and will reduce the period sought so as to make it something like three-score years and ten. It may have been less; it could hardly have been more, and certainly must have been less than four-score years: perhaps half-a-century would be a fair estimate.

These scriptural references may appear rather strange in a scientific periodical, but as the inquiry itself pertains to a chronological and engineering fact, I trust my remarks will be admissible. I find in the Scriptures many scientific problems, and I do not see why a scientific journal should not discuss them, if the inquiry be carried on in a proper spirit, remembering the words which even an uninspired heathen could utter, "Let us concur in this one sentiment—that all things sacred be treated with respect."

I remain, Gentlemen,

Yours very truly,

JOSEPH PITTER.

17, Upper George-street, Greenwich,
January 27, 1858.

THE WAVE-LINE SYSTEM.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—The insertion of the facts contained in your last number, p. 105, is likely to elicit truth, and prevent erroneous conclusions, and therefore you deserve the thanks of such of your readers as are interested in the subject for its publication.

The fact that the ship holds a bad wind when on the starboard tack simply shows that she was rigged to suit the form of the starboard bow; the hollow bow causes the centre of gravity of displacement to be further aft, and consequently the centre of effort of the sails would require to be further aft also. The helm having to be kept down, of course partly accounts for a decrease of speed when on that tack.

Without seeing the lines, or some better description of the form of the vessel, it would be useless to attempt to account for the great diminution of speed in this instance; but I could point out numerous vessels which, if treated in the manner mentioned, would give the same result, without proving anything adverse to the Wave Line System. And I think it a pity that the constructor did not submit the idea to your readers before the vessel was built; had he done so, I think a very different result would have been obtained. Modifications

of the trochoid for full built vessels are easily made; but a mere hollow line is not necessarily a wave line.

I am, Gentlemen,
Your obedient servant,
THOS. MOY.

1, Clifford's-inn, Feb. 1, 1858.

CHAIRS FOR INVALIDS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—My attention having been called to the case of a lady, who, having lost the use of her limbs, is suffering much from the pressure occasioned by sitting all day in a chair, it occurs to me that something might easily be done, in the following manner, to assist sufferers of this class.

The idea is simply to transfer a part of the pressure from the seat to the arm-pits, analogous to using a pair of crutches, which might be done by putting the arms over a pair of crutch-tops, suspended either to india-rubber bands, or to cords passing over pulleys at each side of the back of a chair, having weights hooked on behind; and, of course, by having about three sets, or pairs, of weights, the upward lift could be varied as might be desired.

I am, Sir, your obedient Servant,
SAMUEL B. HOWLETT.

War-office, 27th Jan., 1858.

ELECTROTYPING.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Permit me, through your valuable magazine, to ask some of your clever correspondents to assist me in the following difficulty:—I find that in my decomposition trough, which I made for the purpose of electrotyping, the denser portion of the sulphate of copper sinks to the bottom. Now, what I am in need of is, a train of wheels, which shall keep in motion, for not less than twelve hours, a flange of wood or gutta percha, which flange is to be in the trough for the purpose of disturbing the liquid. I should like to know what number of wheels will be necessary, and what number of teeth each must have, as well as whatever other arrangements will be necessary. The whole will be required to go in a small compass. If any of your correspondents will assist me, they will oblige your reader,

ELECTROTYPE.

Cheltenham, January 30, 1858.

MISCELLANEOUS INTELLIGENCE.

THE EARTHQUAKE AT NAPLES.—The Royal Society has granted a sum of money to Mr. Robert Mallet, from the Government Grant Fund, to assist him in making researches into the phenomena of the recent earthquake in Italy. Mr. Mallet has been furnished with letters to the Neapolitan Government. He left London last Tuesday.

GUÉRIN'S SELF-ACTING RAILWAY-BREAK.—A first trial of this important invention was made this week, at Ashford, by the South-Eastern Railway Company, and was attended with complete success. Guérin's "Centrifugal Regulator" was fitted, at a very trifling outlay, to one of the above Company's ordinary luggage-vans with sliding breaks, in order to show that the new apparatus can be easily adapted to the rolling stock now in use. Next week, we are informed, Guérin's complete system will be applied to one or more first-class carriages; and, about Feb. 8, experiments will be continued on a more extensive scale. So far the results have been highly satisfactory, and merit the attention of the railway world.—*Mining Journal.*

SPECIFICATIONS OF PATENTS RECENTLY FILED.

SCHLESINGER, J. W. *Improvements in the backs and covers of account-books and other books.* Dated May 8, 1857. (A communication.) (No. 1305.)

The book is bound by any ordinary method up to the point of putting on the covers and backs, and then the patentee fixes to the cover a back made of a series of metallic hinges.

HEPPELL, G. *Improvements in ventilating mines and such like places.* Dated May 9, 1857. (No. 1308.)

First, for effecting the ventilation without using open furnaces in the shafts or workings, the patentee adopts an apparatus resembling in its action a double barrel pump, fitted into the up-cast shaft. Should it be required to force pure air into the workings, the same arrangement can be applied to the downcast shaft, the valves being reversed. Second, when it is necessary to effect ventilation by means of draughts caused by fires in the shafts or workings, he so constructs the apparatuses as to prevent the return vitiated air from coming into contact with the fires.

MILES, W. P. *An improved gauge-cutting machine.* Dated May 9, 1857. (No. 1311.)

The patentee causes a bow or cutter holder, something like the bow of the common saw used for cutting iron, to traverse backwards and forwards between two uprights which keep it steady, and allow it to work in different levels, according to the size and number of cuts to be made. In the apparatus arrangements are made for cutting surfaces having hollow centres; also for varying the setting of the cutters so as to produce a series of cuts, some deeper than others.

WATKINS, F. *Improvements in machinery for making rivets, bolts, and spikes.* (A communication.) Dated May 9, 1857. (No. 1313.)

Two wheels are used, the peripheries of which are formed into segments with flat surfaces. In these segments the arms of the dies are so formed that when a flat segment of one wheel is opposite a flat segment of the other wheel, and the two are pressed together, they form a die suitable for making a rivet, bolt, or spike. These wheels are geared together by toothed wheels, the teeth of which admit of the peripheris of the die wheels coming up to, and departing from, each other. The die wheels are made to rotate at intervals by a ratchet wheel and driver. The die wheels are pressed towards each other at the proper intervals by cam surfaces, and a gauge plate cutter and head are similarly actuated.

PYM, J. *Improvements in machinery to be employed on the water for raising and lowering weights.* Dated May 9, 1857. (No. 1315.)

This invention was described and illustrated at p. 553 of No. 1792, Vol. 67.

HOBBS, H., and E. EASTON. *An improved mode of preventing the incrustation of steam-boilers.* Dated May 9, 1857. (No. 1316.)

The patentees employ a solution or paste for acting chemically on and disintegrating already-formed hard deposit, or retaining the deposit as it falls in a loose granular state. The compound consists of arsenious acid and an alkali, by preference carbonate of soda. These they mix in equal parts (by weight) with a small quantity of water, and keep the same boiling slowly until the arsenic is dissolved.

WILSON, R. *Improvements in machinery or apparatus for raising or forcing fluids.* Dated May 11, 1857. (No. 1317.)

This consists—1. In obtaining the pressure required for raising or forcing fluids by the direct application of steam on a piston to which a plunger is attached. 2. In combining the direct application of steam with a weight connected to the piston and plunger, the pressure on the fluid being derived partly from the steam and partly from the weight. 3. In causing steam to raise a weight connected to the plunger, and in making the weight produce the required pressure for raising or forcing the fluid.

MYERS, J. J. *A new method of regulating paper laid on to be printed on one or both sides, at and by cylinder-printing machines, by means of guides, whereby the present waste of paper in progress of printing is avoided.* Dated May 11, 1857. (No. 1318.)

This consists of a rod, each end of which rests upon a carriage-bearing fixed to the side frames of the cylinder-printing machine, above and in connexion with the cylinder and near the laying-on board; and the rod is so fixed as to be readily adjusted by screws that it may be fixed parallel with the form of type. To this rod are affixed vertically flat thin plates, the outside edges of the two extreme ones being turned sideways at right angles to the other side of the same plates. All the plates are affixed to the rod with adjusting apparatus to be applicable for any description of paper. The edges of the paper, whilst passing from the laying-on board to the cylinder, cannot therefore with ordinary care be laid otherwise than in a proper position.

SIEMENS, C. W. *Improvements in furnaces, and in the application of heated currents.* Dated May 11, 1857. (No. 1320.)

See *Mechanics' Magazine*, No. 1799, for Saturday last, p. 97.

MILLER, J. *Improvements in oil-cans or apparatus for lubricating machinery.* Dated May 11, 1857. (No. 1321.)

Oil-cans are fitted up with clock-work mechanism, or spring wheel work, connected with a valve governing the influx of air to the oil chamber. This operates so as to allow the oil to escape only drop by drop. Or the mechanism may work a discharge valve to regulate the flow of the oil.

MILLER, J. *Improvements in water-meters.* Dated May 11, 1857. (No. 1322.)

Two ball floats are so connected with the inflow and discharge valves of a cistern or other vessel that, when the latter valve is opened, the former is closed, and *vice versâ*, the usual wheelwork being employed for registering the number of fillings and emptyings of the cistern, the contents of which are known.

MUCKLOW, J. D. *Certain improvements in the manufacture of rollers or cylinders to be employed for printing calico and other surfaces.* Dated May 11, 1857. (No. 1324.)

The patentee forms the cylinder of iron

or of alloys, either hollow and used upon a mandril (as copper rollers are), or solid, and used without a mandril. Upon the surface of this iron cylinder he produces the design to be printed, and afterwards coats it with nickel, copper, or other metal, by the electrotype process.

HALLETT, S. *Improvements in piano-fortes.* (A communication.) Dated May 11, 1857. (No. 1326.)

The sound boards are made of a curved form, and the strings arranged concentrically with them. The notes may thus be better developed, and a variety of elegant structures be produced.

NEWTON, A. V. *Improved machinery for cutting veneers.* (A communication.) Dated May 11, 1857. (No. 1327.)

This consists, 1st, in giving to the knife and the log to be cut separate and distinct rectilinear motions; 2d, in making the ways upon which the log-carriage moves adjustable relatively to the ways upon which the knife moves, for giving more or less of a drawing action to the cut; 3d, in attaching the appendages for holding the log, and feeding it to the knife to a turn-table fitted to a seat capable of turning upon the log-carriage, and of being secured in any position so as to present the grain of the stuff at any desired angle to the edge of the knife; 4th, in a mode of supporting the log during the cutting; 5th, in mechanism for setting free the clamps and releasing the uncut portion of the log; 6th, in the construction of the clamps: 7th, in rendering the feed motion inoperative, and stopping the descent of the follower when the log is cut up.

HALL, C., and T. CHARLTON. *Improvements in agricultural engines and implements used therewith for ploughing and cultivating the soil.* Dated May 11, 1857. (No. 1328.)

This invention was described and illustrated at p. 554, of No. 1792, Vol. lxvii.

FONTAINEMOREAU, P. A. L. DE. *An improved hydraulic motor.* (A communication.) Dated May 11, 1857. (No. 1330.)

This consists of a number of rectangular bellows or closed buckets suspended by rods fixed at the upper extremity of each bellows, and connected to the rods or links of two endless chains which pass between pulleys. These bellows are immersed in water, and air being made by the pressure of the water to pass freely from one bellows to the other, a continuous rotary motion is imparted to an axis.

MALCOLM, J. D. *Improvements in the construction of buffing apparatus for railway engines and carriages.* Dated May 12, 1857. (No. 1335.)

The object here is to convert railway carriages and engines into a condition analogous to non-elastic soft bodies. This is effected by providing a sufficiency of elastic force to receive the whole shock of a collision and by a ratchet and catch to retain the springs in their compressed condition.

LAMBERT, T., and O. WAKEFIELD. *Improvements in apparatus for drawing off water and other fluids.* Dated May 12, 1857. (No. 1337.)

Here two valves capable of separate action are used, and acted on by the same handle, which is so arranged that it moves on one or other of the spindles of the two valves according as it is for the time being opening the one valve and closing the other, or *vice versâ*.

BROOMAN, R. A. *Improvements in the preparation of steel, and in the steeling or manufacture of tyres, shafts, axles, and other forgings.* (A communication.) Dated May 12, 1857. (No. 1339.)

Bundles or faggots formed of steel bars are heated (the blast being kept from acting directly upon them), and are then covered, in the furnace, with silica and iron scales. The heat is then very greatly increased, and the bundles then removed and welded under the hammer. The whole process is then again repeated. The second part of the invention consists in combining steel plates with iron articles, in a manner which requires engravings to illustrate it.

COCHRANE, J. R. *Improvements in the treatment or manufacture of ornamental fabrics.* Dated May 12, 1857. (No. 1340.)

This relates to that part of the manufacture of woven fabrics of the lappet class wherein the loose surface threads produced in forming the pattern are removed. Under one modification of the machinery employed the unclipped piece is wound upon a roller, and passed therefrom beneath a row of fingers, feelers, or elevators, which catch the loops formed by the loose or flushed threads as the piece traverses forward, and lift them from the surface of the cloth. Between the fingers or feelers and the cloth there is set a horizontal knife, which traverses back and forwards with a cutting action.

NEWTON, W. E. *Improvements in furnaces specially adapted to the generation of steam for motive power, but applicable to furnaces for other purposes.* A communication. Dated May 12, 1857. (No. 1341.)

This consists in burning the fuel in a close furnace with a supply of air forced in above the fuel, and through the flues a forced circulation of the gaseous products is kept up, in combination with a regular admixture of air, until they are thoroughly

oxidated, and have transferred most of the heat evolved to the water in the boiler, after which they are so reduced in bulk and increased in weight (being mainly carbonic acid) as to settle by gravity into a receptacle, whence they escape through a small orifice. The sparks also collect in this receptacle, where they are quenched by the carbonic acid.

MASSEY, W., and J. SMITH. *Improvements in machinery for ploughing and cultivating land.* Dated May 12, 1857. (No. 1342.)

This refers, 1st, to machines in which several implements are used simultaneously, either propelled by steam or other power, and consists in making the frame work so that each implement can work separately, each having by means of guides an independent vertical and backward and forward movement. On the head of each plough is fixed an inclined plane, so that when each plough is brought up by a rack, screw, or chain, to a stop on the frame, the inclined plane comes against the stop, raises the point of the plough, and the onward motion lifts the implement from the ground, in which position it is retained by a catch until required for another furrow. 2d, To making the wheels of the framework serve as guides to regulate the width and depth of the furrow. 3d, To causing the wheels to be turned at right angles when the frame is stopped at the headland, so as to prevent the frame from moving backwards or forwards, but so that it can move sideways to take fresh ground.

MASSEY, W. *Improvements in engines for the cultivation of land by steam power.* Dated May 12, 1857. (No. 1343.)

This mainly consists of a combination of a vertical engine and boiler with windlass barrels upon the same frame, the barrels working from the crank shaft direct, with the facility of disconnecting the rope barrels, and allowing the engine to be applied to any other purpose; also, so that by means of guide rollers the rope is caused to wind evenly upon the barrels.

BRIGGS, T., and J. STARKEY. *Improvements in machines for washing, wringing, and mangling.* Dated May 13, 1857. (No. 1344.)

This refers to machines in which the dasher has rotary or oscillating motion from a central shaft, and consists in the application of two rollers at the extremity of the dasher, which are pressed together by springs, and between which some of the clothes to be washed are held, the remainder being loose in the washing box. Also in fluting the bottom of the washing vessel in the direction of the length of the dasher; likewise the sides of the same. It also relates to roller machines which squeeze the moisture from the materials, and consists in the use of an endless web which carries the clothes between the rollers. For mangling the same rollers answer the purpose, the improvement consisting in the use of an endless sheet as in the preceding case.

YELDHAM, S. *The better application and arrangement of indices to books of all kinds.* Dated May 13, 1857. (No. 1345.)

The patentee claims the use of an index, the leaves of which are caused to protrude beyond the other pages of the book, and to bear the index letters so placed as to come in front, and all simultaneously within view beyond the edges of the other pages.

ELEY, E. *Improvements in the manufacture and application of pipes for heating purposes.* Dated May 13, 1857. (No. 1347.)

This consists in the manufacture and fixing of pipes of certain fluted forms, whereby greater heating surface is obtained. Also in giving such ornamental shape to the pipes that they shall harmonize with the style of architecture of the place where they are fixed.

TOLKIEN, H., and J. MIDDLETON. *Improvements in pianofortes.* Dated May 13, 1857. (No. 1348.)

This refers to obtaining greater permanency and brilliancy of tone in pianofortes by giving additional strength and rigidity to the bracings, and consists in employing a truss convex bracing of wood.

NEWALL, R. S. *Improvements in the manufacture of wire strands for electrical purposes.* Dated May 13, 1857. (No. 1350.)

This consists in effacing the irregularities of the external surface of the strand by reducing it to a cylindrical form, by drawing the strand through dies, or by passing it through rollers, or by filling up the interstices with metal, and reducing the same to the required dimensions with a uniform surface.

KAY, R. D. *Improvements in machinery or apparatus for printing woven or felted fabrics.* (A communication.) Dated May 13, 1857. (No. 1351.)

This consists in printing stripes, &c., on woven fabrics by a modification of the apparatus already used in printing paper.

HENRY, M. *Improvements in winding weft, and in the machinery employed therein, part of which is applicable to spinning machinery.* (A communication.) Dated May 13, 1857. (No. 1354.)

Here yarn, &c., is wound into a bobbin or cop of weft on a receiving cone, being

laid on for the purpose in successive layers, each of which is wound on layers over the preceding one, but comes a little, say one or more turns, more forward than it, whereby the layers are made to hold firmly together, and the wound weft thus formed into a cop may be carried about without becoming undone or giving way in the shuttle, and at the same time have any desired form imparted to it. The yarn, &c., while being wound on, has both an oscillating and a continuous progressive motion communicated to it. This invention does not, apparently, admit of its being fully described without much elaboration.

ASHBY, W. *Improvements in water-wheels.* Dated May 14, 1857. (No. 1360.)

This relates to arranging the buckets or floats of water-wheels, so that they will hold a greater quantity of water, and for a longer time than those previously used, by bending up the edge in the direction of the periphery of the wheel.

HYDE, W. and J. *Improvements in the construction of vices.* Dated May 14, 1857. (No. 1361.)

This invention cannot be described without engravings.

HESSE, D. and M. *Certain improvements in the manufacture of shirts, shirt-fronts, and other articles of wearing apparel.* Dated May 14, 1857. (No. 1362.)

This consists, under one arrangement, in providing a substitute for plaiting or folding cloth in the manufacture of shirts, &c., by placing two single cloths upon each other, and stitching the same together in close rows, by which are formed between the rows of stitching narrow loose stripes, which are afterwards to be filled up with cords, &c.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

HEINEMANN, L. and A. *Improvements in waterproofing woven fabrics and fibrous materials.* Dated May 8, 1857. (No. 1306.)

The inventors take pure alumina dissolved in an acid—vegetable in preference—and add water, which forms a solution in which they put the fabric or material. After taking it out they dry and steam it. The steaming causes any superfluous acid to evaporate, thus finishing the combination of the alumina with the fibre, and preventing any disagreeable smell.

GLOVER, W. *Improvements in machinery for weaving.* Dated May 9, 1857. (No. 1307.)

The main feature here consists in the application of a circular revolving warp, and of a stationary shuttle or other instrument containing the weft.

HEBDON, W. *Testing the strength of woollen cloth, linen, and all other woven fabrics, also of every description of material upon which a strain can be exerted.* Dated May 9, 1857. (No. 1309.)

Each end of the pattern of cloth to be tested is placed between chaps, of which the upper chaps are fastened on the under by screws. Tension is exerted upon the pattern by turning a wheel. The screw draws the chap towards the wheel, bringing with it the pattern which, in stretching, moves another chap which communicates with a spring balance. When the pattern begins to give way the hand of the balance retires, leaving an indicator pointing out on the dial the strength of the cloth.

FRANCIS, J. H., and R. ORD. *Improvements in the means and apparatus employed for cleaning casks.* Dated May 9, 1857. (No. 1310.)

This relates partly to patent granted to R. Davison and W. Symington, 2d of Nov., 1813; and partly to an invention protected on the 11th of Feb., 1857, by G. C. Potts. The principal feature consists in an improved construction of frame for holding the cask to be cleansed, which frame is capable of receiving casks of different sizes. The inventors propose to use slags or clinkers broken into small pieces, and placed with water inside the cask, and removed therefrom without taking out the head.

MACCARTHY, J. S. *Improvements in driving or ramming paving blocks and other surfaces.* Dated May 9, 1857. (No. 1812.)

This consists in the use of a number of heavy rams contained in a frame on wheels, traversed over the surface to be rammed, and driven by steam or other power. As fast as one set of blocks are driven home the machine is traversed forward, to bring the next set under the rams, and so on.

HOW, A. P. *Improvements in circular brushes for sweeping boiler and other tubes.* Dated May 9, 1857. (No. 1314.)

This invention was described and illustrated at p. 345, of No. 1783, Vol. lxvii.

DAWSON, A. *An improved wrought-iron cock, suitable for water, steam, or gas.* Dated May 11, 1857. (No. 1319.)

A piece of wrought iron tube is heated and upset, or thickened, in an iron mould at that part where the plug or key is to be fitted. The ends are then formed to the shape required, and screwed. The hole for the plug or key is then made, and the cock is then tinned or galvanised, and the key or plug fitted.

BORRON, W. G. *Improvements in closing or stoppering bottles, jars, and other*

receptacles. Dated May 11, 1857. (No. 1323.)

As regards bottles, a screw thread is cut or moulded within the neck, and in this a screwed stopper is fitted. This (wooden) stopper projects and is squared to fit in a glass cap piece. Marine glue is applied between the stopper and its cap. A small ring of cork is passed upon the wood stopper, so that when the stopper is screwed into place it may be tight.

FITTON, R., and S. HALL. *Certain improvements in machinery or apparatus for spinning cotton and other fibrous substances.* Dated May 11, 1857. (No. 1325.)

This relates to self-acting mules, and to such parts of them as effect the change of gearing for running the spindle-carriage in and out. It consists in the use of a novel clutch-box or catch-box, one-half formed of a disc of steel hardened, and the other having a stud fixed on the boss of the bevel-wheel which drives the motion working the carriage. The disc being perforated with holes corresponding with the stud will (upon being forced into contact) effect the connexion of the gearing.

BROOMAN, R. A. *An improved locomotive apparatus for rail and ordinary roads.* (A communication.) Dated May 11, 1857. (No. 1329.)

This consists of a carriage carrying its own endless railway in the shape of two large wheels, one on each side of the carriage. The wheels are formed on the inside with an endless circular rack. The propelling power is imparted through a wheel on each side of the carriage fitted with cogs which take into the rack, and are driven by a steam engine.

COTTERILL, E. *A new or improved method of preventing the picking of ordinary locks and other fastenings.* Dated May 12, 1857. (No. 1331.)

This consists in placing in the key-hole of a lock a small folding instrument to prevent the lock from being picked, and which is itself fastened by a small lock.

BUSSON, C. A. *Improvements in rotary engines.* Dated May 12, 1857. (No. 1332.)

This consists in causing the steam, &c., to enter between a pair of pistons, one fixed to the casing, the other to a disc, and having a circular motion in the casing, both pistons moving in the same direction but with different speeds, each serving alternately as a rest and as a moving part, both pistons being allowed to come close to each other, but not in contact.

CARBONINO, R. C. *Improvements in nose-bags.* Dated May 12, 1857. (No. 1333.)

Here the bottom of the bag is caused to rise as the fodder is consumed by means of a counter weight hanging below the bottom of the bag.

WESTLAKE, J. *Improvements in cleaning, separating, and dressing ores of pulverised tin, copper, lead, silver, and other minerals, ores, and substances.* Dated May 12, 1857. (No. 1334.)

This consists mainly in the use of two apparatuses called the "separator" and "slime dresser." Into the first the mineral flows mixed with water; the heavy particles fall to the bottom, and the light pass on to a second division, and so on from one compartment to another until the finest portion of the ore in solution is discharged into the slime dresser, which consists of two or more vessels each in the form of an inverted cone placed one within the other, and as the ore in solution reaches the bottom edge of the inner cistern it ascends upwards through an opening between the two cisterns; and as the ore in solution ascends the heavy particles fall to the bottom, and the foul water and slime flow over the edge of the outer cistern and are carried off by a waste shoot. Any number of these double cisterns may be used.

BARLOW, W. H., and W. H. MILLS. *Improvements in the permanent ways of railways.* Dated May 12, 1857. (No. 1336.)

Cast iron bearing plates are used, divided longitudinally, and hinged together so that the jaws which receive the rails may open out a short distance to admit of wood keys, or wedges, being introduced between the jaws and the sides of the plates held between them, whereby, when the wood keys become loose, the pressure of the passing trains will, by the hinging of the bearing plates, cause the upper parts of the jaws to clip the rails and filling pieces more tightly.

DUBOIS, J. C. *Improvements in castors.* Dated May 12, 1857. (No. 1338.)

Here each castor is made with one large and several small spheres. The largest sphere comes to the floor: directly above it are smaller spheres, one above the other, which bear the weight and reduce the friction on the larger sphere. There are other spheres around the large sphere to facilitate its rotation.

BONNEY, W. W. *A chemical composition or agent to be employed in lieu of, or to be substituted for, argol, tartar, and tartaric acid.* (A communication.) Dated May 13, 1857. (No. 1346.)

The inventor first prepares stannic chloride (*chlorure stannique*) by mixing $1\frac{3}{4}$ oz. of salt, $8\frac{3}{4}$ lb. muriatic acid, $2\frac{1}{4}$ lb. nitric acid, and by dissolving tin in the liquid

thus obtained, adding the metal a little at a time. He then manufactures the composition to be used as a substitute for tartar by dissolving 6¼ lb. oxalic acid in about 66 lb. hot water, and about 6¼ lb. stannic chloride in about 66 lb. cold water. He stirs for about ½ an hour, then adds about 13¼ lb. of sulphuric acid, stirs again, and when the two solutions are cold he mixes them together, and leaves them to settle.

FITZGIBBON, A. *Improvements in the form of rails for use in railways and tramways.* Dated May 13, 1857. (No. 1349.)

The lower flanges of the rails are formed with projecting lugs at intervals, through which holes are made for receiving the screws or bolts.

AGAR, N. *Improvements in connecting spindles of locks and latches with their knobs and handles.* Dated May 13, 1857. (No. 1352.)

This relates to a previous patent of the patentee dated 4th Feb., 1856, and consists in so arranging the spindle as to be formed square, and with a screw thread cut on its angles, together with certain nuts, &c., in a manner which cannot be described without engravings.

PEAK, J. *Improvements in the manufacture of gas.* Dated May 13, 1857. (No. 1353.)

This consists in manufacturing gas from tar, resin, or the products derived therefrom by distillation, either from those products alone or with the addition of water or steam. The inventor drops the said products into a retort filled with charcoal, &c., from which it passes in a state of decomposition into another retort, and passes it from thence into the hydraulic main direct to the gasometer.

FIELDING, J. *An improvement in apparatus applicable to steam pipes or cylinders used for heating and drying, which said apparatus may be similarly employed wherever steam is used for such purposes.* Dated May 13, 1857. (No. 1355.)

This relates to a previous patent of the patentee, dated 21st Feb., 1857, and consists in dispensing with the air valve placed in the lid or cover of the steam chamber of the apparatus, and also with the lift valve for the discharge of the water at the bottom of the same. In lieu of these two lift valves he substitutes a compound air and water valve.

ALDERTON, W. A. *Improvements in spindles for door locks, latches, and other similar purposes.* Dated May 13, 1857. (No. 1356.)

Here the two ends of the spindle have a screw thread made upon them, the central portion thereof being square or polygonal in section. The knobs are screwed on to the nuts of the spindle, and are locked thereon by means of a collar and washer of a peculiar construction.

SAUERBREY, V. *Improvements in the manufacture of fire-arms.* Dated May 14, 1857. (No. 1358.)

In this invention, by passing a hollowed cylinder in the barrels of guns, pistols, &c., and by giving to it a suitable helical motion, there is obtained at the same time all the helical grooves, which till now were made one after the other.

SISSONS, W., and P. WHITE. *Improvements in steam pile driving machinery.* Dated May 14, 1857. (No. 1359.)

The inventors attach to an ordinary pile driving machine a steam winch, worked with cylinders attached to the raking part of the winch frame, and to a spiked winding barrel, a flat linked chain round the winding barrel, and a spiked wheel at the top of the pile frame. To lift the monkey a pair of nippers are attached to its horns, which clip into the chair while in motion, and carry up the monkey, and these nippers may be struck off at any height, either by hand or by self-acting machinery, to disengage the hammer. The invention also includes the use of a common instead of a flat-linked chain, also arrangements for pitching the pile.

PROVISIONAL PROTECTIONS.

Dated December 21, 1857.

3127. William Thrift and Adam High, of Stepney. An improved self-acting ship's water-closet.

Dated December 28, 1857.

3174. Henry Desmoutls, of Paris, manufacturer. New metallic alloys.

Dated January 7, 1858.

28. Eliza Graham, of Noel-street, Islington. An improved apparatus for threading needles.

Dated January 11, 1858.

43. William Tregaskis, of St. Andrew's-hill, Thames-street. Improvements in the printing-press.

45. Isaac Taylor, of Stanford Rivers, Essex. Improvements in manufacturing metallic cylinders used in printing calico and other fabrics, and in imparting engravings to metallic cylinders used for such purposes.

Dated January 12, 1858.

47. Edward Hammond Bentall, of Heybridge, Essex, agricultural implement manufacturer. An improved arrangement of portable gearing apparatus for the application of horse power, principally for driving various kinds of agricultural machines or implements.

49. John Henry Johnson, of Lincoln's-inn-fields. Improvements in boilers and heating apparatus generally. A communication from E. A. Chameroy, of Paris.

Dated January 13, 1858.

51. Charles Barlow, of Chancery-lane. An improved registering water-meter. A communication.

53. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., patent agent. Improvements in the preparation of coal and other fuel. A communication from A. M. M. de Bergevin, and E. C. Salva, of Paris.

55. Patrick Robertson, of Sun-court, Cornhill. Improvements in inkstands. A communication.

57. Charles Edward Matson, of Church-street, Deptford, omnibus proprietor. Improvements in roughing horses' shoes.

Dated January 14, 1858.

59. Nicolas Eugène Jeanroy, of Paris. Improvements in the manufacture of net lace.

60. William Woodcock and Thomas Blackburn, of Sough, near Blackburn, and James Smalley, of Blackburn. Improvements in machinery or apparatus for heating and circulating air, to be applied to all purposes where heating is required.

61. James Alexander Manning, of the Inner Temple, Esq. Improvements in the treatment of sewerage and other polluted liquids.

62. James Broadley, of Saltaire, near Bradford, York, overlooker. Improvements in apparatus used in weaving.

63. Joseph Stenson, of Northampton, civil engineer and iron manufacturer. Improvements in the manufacture of wrought iron.

64. Henry Ingle, of Shoe-lane, engineer. Improvements in printing machines.

65. William Clark, of Chancery-lane. Certain improvements applicable to the paying out of submarine or submerged telegraph wires or cables. A communication.

Dated January 15, 1858.

66. John Varley, of Radcliffe, Lancaster. Improvements in steam-engines.

67. Charles Schinz, of Camden, New Jersey, United States, chemist. An apparatus for manufacturing prussiate of potash.

69. David Bowlas, of Reddish, Lancaster, cotton-spinner. Improvements in machinery or apparatus for preparing and spinning cotton and other fibrous substances.

Dated January 16, 1858.

71. Richard John Badge, of Newton Heath, near Manchester, storekeeper. Improvements in machinery or apparatus for drawing or extracting spikes or trenails from railway sleepers and chairs, and other similar purposes.

72. James Austin, of Millisle Mills, Donaghadee, Ireland, bookkeeper. Improvements in machinery or apparatus for ploughing or cultivating land.

73. Robert Archibald, of Tillicoultry, Clackmannan, manufacturer. Improvements in the treatment or preparation of wool, and other fibrous materials for being spun.

74. George Macbeth, of Manchester, tailor. A certain improvement applicable to sewing machines.

75. Frederick Hyde, of Glossop, Derby, mechanic. Improvements in machinery or apparatus for spinning, doubling, twisting, or throwing cotton, silk, wool, flax, and other fibrous substances.

76. Edwin Hills, of Warsash, Southampton, merchant. An improved process for manufacturing sulphate of ammonia.

77. Patrick Robertson, of Sun-court, Cornhill. Improvements in lamps. A communication.

78. Charles Amedée de Laire de la Brosse, of Paris, gentleman. Improvements in apparatus or machinery for the manufacture of looped or knitted fabrics. A communication.

79. Edward Rosa, of Edinburgh, chiropodist. Improvements in the manufacture of dough and other plastic or porous substances.

Dated January 19, 1858.

81. Thomas and James Hamilton, of Glasgow, bobbin turners. Improvements in holders or bobbins for holding or containing yarn or thread, and in turning, cutting, shaping, and reducing wood and other substances.

82. Andrew Walker, of Shotts, Lanark, moulder, and Thomas Walker, of the same place, pattern maker. Improvements in the treatment or preparation of moulds for casting metals.

83. Edward Wilson, of Worcester. Improvements in pistons for steam engines driven by steam or any other elastic fluid, which improvements are also applicable to the pistons or plungers of pumps.

84. William Waller, of Uddingston, near Glasgow, mechanical engineer. Improvements in machinery for grinding, bruising, breaking, and cutting cereals, grasses, and other vegetable substances.

85. William Waller, of Uddingston, near Glasgow, mechanical engineer. Improvements in thrashing machines, or machinery for thrashing and dressing grain.

87. Peter Schuyler Bruff, of Ipswich, civil engineer. Improvements in the construction of submerged tunnels.

88. Giuseppe Antonio Tremeschini, of Vicenza (Venetian Lombardy), mechanician. Improved methods and mechanical arrangements for applying cardboard to the weaving of figured fabrics and for arranging the cardboard for this purpose.

89. Benjamin Blake Wells, of the Strand, cutler. Improvements in ordnance.

90. John Henry Johnson, of Lincoln's-inn-fields. Improvements in the boxes and journals of carriage wheels and axles, and in journals and bearings generally. A communication from I. P. Wendell and J. L. Wendell, of Philadelphia.

91. Thomas Pirie, of Nether Kinmundy, Aberdeen, agricultural implement maker. Improvements in machinery or apparatus for thrashing or separating grain.

92. Philip Capon, of Chancery-lane, bookbinder. Improvements in apparatus for binding together pamphlets, letters, music, and other loose documents or sheets.

93. Otto Von Corvin, of Alfred-place, Brompton, gentleman. Improvements in the mode of inlaying or ornamenting in metals and other materials.

Dated January 20, 1858.

94. Christopher Nugent Nixon, of Ramsgate, gentleman. Improvements in the application of screw power, such improvements being applicable to steering apparatus, capstans, windlasses, cranes, winches, and other mechanical purposes.

96. Thomas Heppleston, of Manchester, machine maker. Certain improvements in machinery or apparatus for winding yarns or threads.

100. Charles Rishworth, of Sheffield, railway spring maker. An improved construction of spring for sustaining loads and moderating concussion.

102. John James Russell, of Wednesbury, iron tube manufacturer. Improvements in apparatus used in the manufacture of welded tubes.

104. Patrick Robertson, of Sun-street, Cornhill. Improvements in the manufacture of paints. A communication.

NOTICES OF INTENTION TO PROCEED.

(From the "London Gazette," February 2, 1858.)

2456. R. Lawson. Certain improvements in apparatus for regulating the admission of air to furnaces.

2458. G. Rennie. Improvements in vessels for war and revenue purposes.

2469. W. B. Johnson. Improvements in raising and lowering trucks, carriages, engines, or other such railway appendages from one level to another.

2473. A. B. Patterson. Improved mode of laying submarine cables.

2475. J. Kelshaw and J. Wilkinson. Improvements in self-acting couplings for railway carriages and engines.

2476. L. Newton. Improvements in the mode of placing tubes on the spindles used in spinning machinery.

2484. J. Lewis. Certain improvements in machinery or apparatus for making bricks, tiles, and other similar articles, and also in the machinery for preparing clay for the same manufacture.

2490. R. Kay. Certain improvements in machinery or apparatus for printing calico and other textile fabrics.

2493. W. Bowler. Improvements in the manufacture of hats and other coverings for the head.

2498. W. W. White and W. Bull. Improvements in rollers applicable for blinds, maps, and other purposes.

2501. R. A. Brooman. Improvements in raising and lowering weights and bodies in mines and other like places, in ventilating mines and other like places, and in extracting water therefrom. A communication.

2509. J. H. Johnson. An improved hand saw. A communication.

2512. J. Paisley and G. Bertram. Improvements n the manufacture of paper.

2516. W. Sandilands. Improvements in chimney cans, or apparatus for promoting draught in chimneys.

2518. J. Harris. Improvements in, and connected with, cocks and valves, especially adapted to preventing the bursting of water pipes from frost.

2521. E. Leigh. Improvements in machinery or apparatus used in spinning and preparing cotton and other fibrous substances, parts of which are also applicable to machinery or apparatus generally.

2527. A. and H. Illingworth. Improvements in machinery or apparatus for combing wool and other fibrous substances.

2552. J. Coombe. Improvements in machinery for hackling and preparing flax and other fibrous substances.

2568. R. Romaine. Improvements in machinery for digging or cultivating land, part of which improvements is applicable to agricultural steam engines generally.

2626. J. H. Johnson. Improvements in producing figured paper to be used in teaching writing and drawing. A communication.

2649. J. Wright. Improvements in preparing or treating strips of steel for hardening and tempering.

2667. V. Péan. Improvements in protecting the walls, ceilings, wainscots, and other parts of buildings from humidity.

2696. J. Milne. Certain improvements in carding engines.

2788. J. Mallison, jun. Certain improvements in "gassing" yarn and textile fabrics and in the apparatus connected therewith.

2796. J. Seithen. Improvements in machinery for cutting cork.

2820. W. Macnab. Improvements in vessels propelled by screw or other similar propellers.

2976. D. K. Clark. Improvements in furnaces for promoting the combustion of fuel without smoke, and the communication of heat, specially adapted to steam boilers.

2986. T. J. Thompson. Improvements in apparatus for lighting railway trains with gas.

3001. E. Slack. Improvements in the treatment, application, and use of wheat and other grains, and amylaceous vegetable substances.

3022. J. Sinclair. Improvements in machinery or apparatus for cutting or dividing stone and marble.

3139. A. C. Kennard. Improvements in trussed iron bridges. A communication.

3146. D. J. Crossley. Improvements in the manufacture of certain textile fabrics called "pellones," and used for saddle covers, and in the machinery or apparatus employed therein, which improvements are also applicable for weaving other fabrics.

3165. A. Chaplin. Improvements in steam-engines and in the combustion of fuel.

3170. J. H. Johnson. Improvements in the treatment and preservation of skins, furs, wool, and textile fabrics, and in the machinery or apparatus employed therein. A communication.

3171. H. Deacon. Improvements in purifying alkaline lees.

3172. J. Boydell. Improvements in carriages propelled by steam or other power.

3181. A. Parkes. Improvements in joining or uniting metals.

3188. T. Booth. Improvements in the treatment of certain vegetable matters, and in the application of the same to sizeing, stiffening, dressing, and finishing textile materials, and which is also applicable to thickening colours for printing.

3189. J. D. Morrison. Improvements in effecting surgical and medical operations by the agency of artificially induced anæsthesia.

5. A. and H. Parkes. Improvements in the manufacture of rods, wire, nails, and tubes.

30. E. Maw. Improvements in the construction of metallic bedsteads and other surfaces to sit or recline on.

62. J. Broadley. Improvements in apparatus used in weaving.

70. M. A. F. Mennons. Certain improvements in gas retorts. A communication.

72. J. Austin. Improvements in machinery or apparatus for ploughing or cultivating land.

73. R. Archibald. Improvements in the treatment or preparation of wool, and other fibrous materials for being spun.

81. T. and J. Hamilton. Improvements in holders or bobbins for holding or containing yarn or thread, and in turning, cutting, shaping, and reducing wood and other substances.

82. A. and T. Walker. Improvements in the treatment or preparation of moulds for casting metals.

87. P. S. Bruff. Improvements in the construction of submerged tunnels.

91. T. Pirie. Improvements in machinery or apparatus for thrashing or separating grain.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

234. Arthur Lyon.
236. George Price.
237. James Howard.
240. John Francis Porter.
244. Thomas Ogden Dixon.
250. George Ritchie.
1060. Edward and Thomas Humphries.

LIST OF SEALED PATENTS.

Sealed January 29th, 1858.

2086. Thomas Markland.
2087. Henry Genhart.
2089. George Inman.
2098. William Hopkinson.
2100. Richard Archibald Brooman.
2101. George Brooks Pettit and Henry Fly Smith.
2111. Charles Iles.
2118. Thomas Lyne.
2134. John Langford and Joseph Wilder.
2155. William Pratchitt and Samuel Horrocks.
2159. Alfred Vincent Newton.
2802. Charles Edwards Amos.

Sealed February 2d, 1858.

2103. Robert Davison and James Lee.
2108. Alexander Prince.
2148. William Lyell Groundwater and Henry Prince.
2206. Robert Clark Gist.
2234. Perry G. Gardiner.
2262. Alfred Vincent Newton.
2280. Jules Alphonse Chartier.
2662. William Osborne.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICES TO CORRESPONDENTS.

T. White.—Your letter, which reached us too late for this week's Number, shall be inserted in our next.

J. A. D.—Your communications have been received, and shall meet with due attention.

J. Lawrence.—Your protest has been received. We cannot consider that by taking exception to one imputation of a correspondent we thereby give him the right to have a dozen additional ones inserted. From information which we possess we could entirely change the aspect of the facts you state, but this would involve a controversy which we cannot have forced upon us.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

CONTENTS OF THIS NUMBER.

Messrs. Barton and Son's Patent Shaping, Planing, and Slotting Machine (*with engravings*) ... 121
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GREEN'S APPARATUS FOR ECONOMISING FUEL.

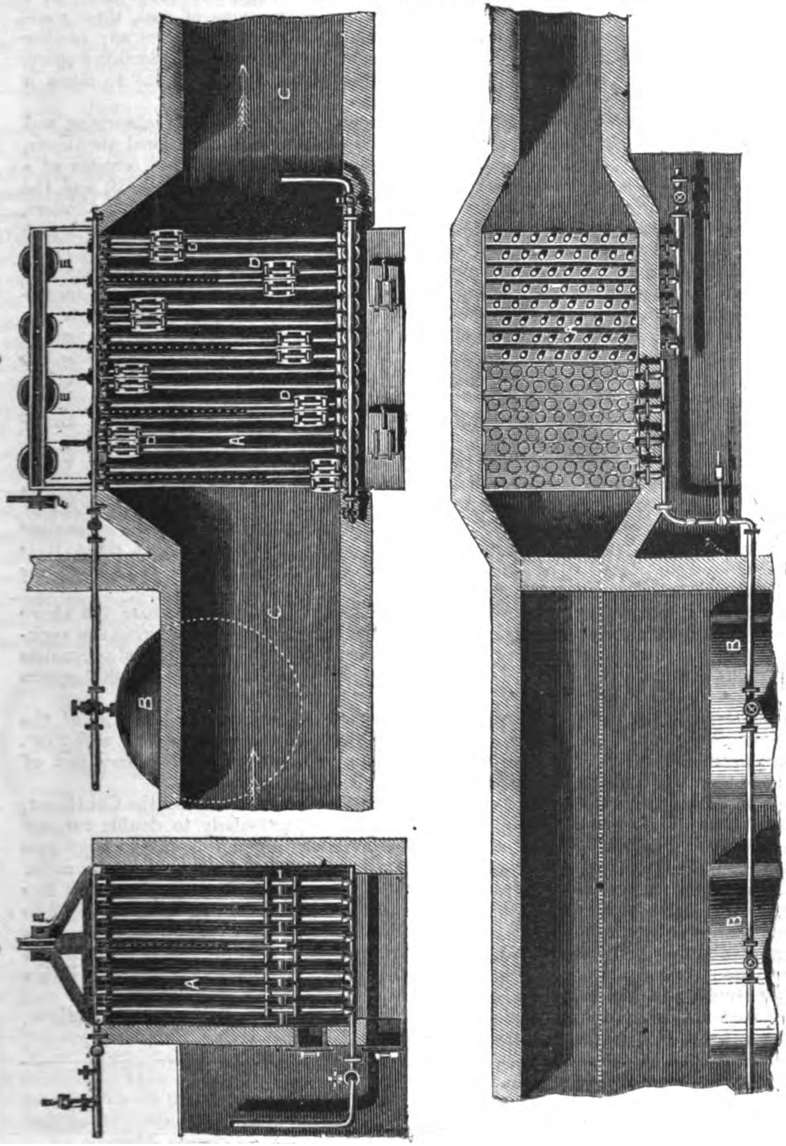

Fig. 1.

Fig. 2.

Fig. 3.

GREEN'S APPARATUS FOR ECONOMISING FUEL.

BY W. G. CRAIG, OF MANCHESTER.*

The object of this apparatus, which is the invention of Mr. Green, of Wakefield, is to economise fuel and increase the evaporative power of the boiler. The necessity for such an apparatus is founded on the assumption that the heat from the furnaces of steam boilers cannot be effectually or sufficiently absorbed by an ordinary boiler surface, for in all cases it is found that when the temperature of the gases becomes reduced down to a certain point, this point varying slightly with various descriptions of coal, there commences a formation of soot, which, being a bad conductor of heat, renders any further exposed boiler surface of little or no service. It is at this stage that a considerable amount of heat still remains in the gases, and in that case there is no alternative but to allow it uselessly to escape at the chimney.

The apparatus now to be described is for the purpose of effectually absorbing and rendering practically useful this surplus heat. It is shown in the sectional elevations, Figs. 1 and 2, and the sectional plan, Fig. 3, on the preceding page, and consists of a series of upright pipes or tubes, A, A, introduced between the boilers, B, B, and the chimney flue, C, through which the feed water is made to pass on its way to the boilers, and is there heated to above the boiling point, and a considerable quantity of steam is also generated before the water enters the boiler. The idea on which its practicability is founded is a very obvious one, that of placing a number of pipes in the flues; but the practical solution was not so easy, as the great defect yet to be overcome was the formation of a coating of soot on the pipes—a defect which has impeded previous attempts of a similar character. This difficulty is entirely obviated by an apparatus of scrapers or cleaners, which consist of connected rings, D, D, made to encircle the pipes; these are constantly but slowly kept in motion by means of the chains and pulleys, E, E, driven by a belt, F, from the engine; the scrapers traversing the whole length of the pipes, and thus preventing any accumulation of soot on their outer surfaces, and facilitating the transmission of the heat to the feed water.

The temperature of the feed water as supplied to the boiler in this arrangement varies according to the heat in the flues and the quantity of heating surface exposed by the pipes. It is found that when the waste heat from the boiler escapes even as low as from 400° to 500°, the feed water can be heated to an average of 225°, the temperature of the gases after leaving the heating pipes being reduced to about 250°. To produce this effect it is generally found that about 10 square feet of heating surface in the pipes is required for each horse power.

At Messrs. Thomas Hoyle and Son's Print Works in Manchester, where the above apparatus has been applied to eight large boilers, the heat of the water entering the apparatus is 40°, and this is raised to an average temperature of 249°. This apparatus consists of 200 pipes, 4 inches diameter and 9 feet long, presenting a heating surface of 2,000 square feet.

At the Oxford-road Mills of Messrs. Cook, the feed water from the hot well of the engine enters the apparatus at a temperature of 130° and is there raised to 250° and 275°. The apparatus consists in this case of 160 pipes, presenting about 1,700 square feet of heating surface, and it is applied to multitubular boilers.

This apparatus is now extensively adopted in this country and also on the Continent, and has been applied to most varieties of boiler, but more particularly to double furnace and multitubular boilers. It is now in operation on boilers amounting in the aggregate to about 25,000 horse power. The results obtained at several of the largest cotton mills, print works, paper mills, &c., where this apparatus has been at work for four and five years, show a saving to have been effected by it in the consumption of coal of from 17 to 25 per cent., varying with the different descriptions of boilers, situations, &c. An important point in this apparatus is, that it will last longer than the boiler, as it is not liable to get out of repair; and it can be applied to new or old boilers of any description without stopping the works.

A discussion followed the reading of the above paper, or rather a series of interrogations, the replies to which were uniformly in favour of the apparatus of Mr. Green.

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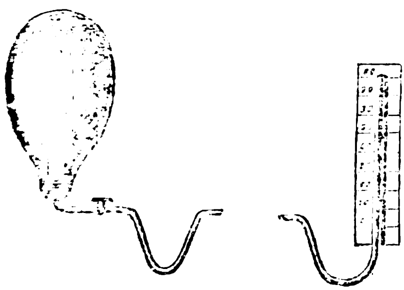
* A paper read before the Institution of Mechanical Engineers.

SPONTANEOUS COMBUSTION ON SHIPBOARD.

The recent disastrous fire on board the *Sarah Sands*, while laden with troops, has drawn attention anew to the subject of spontaneous combustion in the holds, coal-bunkers, store-rooms, &c., of ships. It may, therefore, be well to make known the fact that the matter has long been dealt with by Mr. Hay, the Admiralty Chemist, in H. M. Dockyard, Portsmouth. In 1846 that gentleman submitted to the Admiralty a plan, afterwards adopted in H. M.'s navy, which consisted in inserting iron tubes into the coal-bunkers in order to afford facility for testing their temperature periodically by lowering thermometers down into them, the results being duly recorded. He, however, found in practice that the withdrawal of the thermometer from the tube created a current sufficient to reduce the temperature of the thermometer, and thereby cause the record to be somewhat incorrect. In addition to which it is manifest that a small amount of combustion going on in a bunker would hardly be appreciable by the ordinary mercurial thermometer. Impressed by these considerations, Mr. Hay, after mature reflection, perfected a plan which received the highest commendation of Sir James Graham, when First Lord of the Admiralty, who felt so satisfied with its merits that he stated it as his opinion that no ship, whether belonging to Government or to the merchant service, should go to sea without having it applied. We have ourselves had the satisfaction of witnessing its utility and simplicity. The



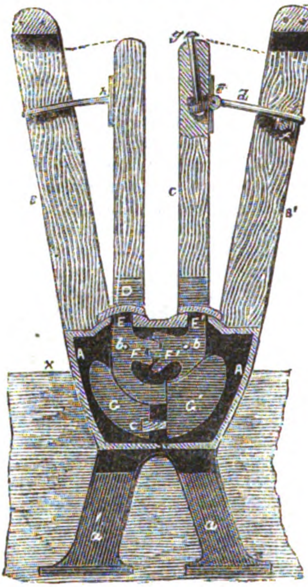
annexed sketch will explain it. A thin copper or iron cylinder inverted is employed, of a capacity of from one pint to a gallon, according to the size of coal-bunker, hold, or store-room to which it is applied. A small iron tube of ¼-inch to ½-inch bore is connected with the air cylinder, and may be led to any distance. It is terminated with an upright glass tube attached to a graduated scale which may be fixed in any convenient position, such as in the captain's or engineer's cabin, or near the post of the officer on duty; or when attached to stores or buildings on shore, the thermometer would be fixed outside of the door or porch, where it might be inspected by the police or others on duty. The tube is filled up to the zero on the scale with a solution of soda and water, tinted with litmus or any other colouring matter, and may be regulated as to degrees of temperature like an ordinary thermometer. The two curved or syphon portions of the tube are intended to counterbalance any sudden rise or fall that may be occasioned by the motion of the ship, &c. The principle of the apparatus is well understood by our readers:—air expands with the slightest increment of heat, or increase in its temperature; but a bucket full of pyrites, or a bale of cotton, may be in a state of decomposition or slow combustion some time before it produces sufficient heat to be indicated by the mercurial thermometer; whereas the slightest expansion of the air in the metal cylinder of the apparatus above described would show a material rise of the fluid in the glass tube of the indicator. The cylinders may, of course, be protected from accident by strong perforated iron cases. The adaptation of apparatus to purposes like that under consideration is one of the most important advantages which can be derived by the Admiralty from the scientific knowledge of its officers, and we hope the present suggestion will not be allowed to fall to the ground, as the security of life and property from fire is every day becoming more desirable both on land and at sea.

LYNE'S PATENT FIELD STILE.

Mr. T. Lyne, of Malmesbury, Wilts, has patented an improved stile or gate which shall open sideways upon pressure being applied thereto to allow of the passage of a person, and which shall close immediately the pressure is removed, and prevent the passage of cattle through it, except when kept open purposely.

The annexed engraving is an elevation chiefly in section of one of the improved field stiles. A, A, is the box cast with legs, *a*, *a*, which steady it in the ground; B, B, B′, B′, of which the two back ones only are shown in the engraving, are stationary posts let into the four corners of the box. C, C, are the moveable uprights, they are received by metal sockets, D, D, in the upper ends of the levers, E, E′, centred upon bolts or pins, *b*, *b*; F, F′, are

projections on the levers, terminating in teeth which work into each other; G, is a

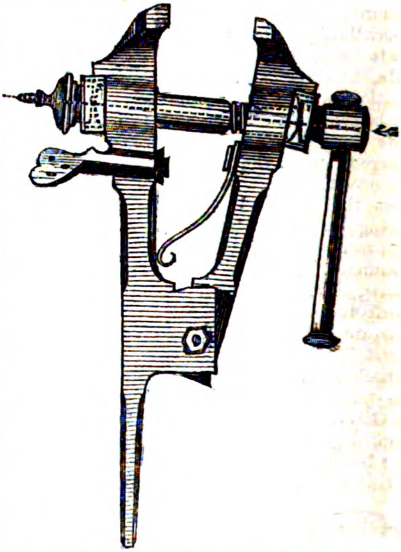


counterbalance weight cast on the lower end of the lever; E and G′, a similar weight on the lever, E′; c, is a wooden block let into the weight, G′, to receive the shock upon the two uprights closing. A catch is represented which may be fitted where it is considered necessary to prevent the stile being accidentally opened: *d*, is a lever centered at *e*, the short arm of which is forked and enters a hole cut for its reception in one of the moveable uprights; the opposite arm is formed as shown in the figure, and fits over a stud, *f*, in one of the fixed posts; *g*, is a rod terminating at top in a knob, and receiving in a notch at bottom the short forked arm of the lever, *d*. On pressing down the rod the long arm will be disengaged from the stud, and the moveable uprights can be pushed sideways to allow of a passage through the stile; *h*, is a rod fixed to the moveable upright, C; the rod acts as a guide and works through between the fixed posts, B, B. X, is the ground line.

Upon either or both of the moveable uprights being pushed laterally the levers will play upon their centres and the weights will both be raised. And as soon as pressure upon the uprights is released the weights fall back, and thus restore the uprights to their original position.

NEUILLIÉS' PATENT VICES.

The ordinary vice gives way almost always at the eyes, the screw, or the box, in consequence of the strain brought upon those parts by the moveable jaw describing a curve about a centre. An improvement lately patented by Monsieur Neuilliés, and applied in "*the Vice du Nord*," gets rid of these defects and ensures a pressure always acting in the direction of the axis of the screw, whatever may be the space between the jaws. It consists in the introduction, between the shoulder of the screw and the leg of the vice, of a curved nut or washer, as indicated in the annexed engraving, in



which the inner shape of the nut or washer is shown in dotted lines. The form and arrangement of the nut may be modified, and it may be applied to the back of one jaw only, instead of to both, as in the engraving.

Abridgments of the Specifications relating to Marine Propulsion. (Excluding Sails.) Part II. Printed by order of the Commissioners of Patents. 1858.

This second instalment of the "Abridgments of Specifications of Patents relating to Marine Propulsion" (prepared by the same author, and with the same skill, as Part I., noticed at p. 106 of our last volume), will be received with pleasure by many, for it relates to a subject which, more than any other, seems to fascinate the inventive minds of the age. Having previously expressed our

high sense of Mr. Macgregor's mode of editing this class of the abridgments, to explain the nature and objects of the publication we cannot do better than quote the following Preface to Part II. from the pen of Mr. Woodcroft:—

"In Part I. of this work there is a summary of the principal British and foreign inventions relating to the propulsion of vessels. These are arranged chronologically, with Abridgments of the Specifications of British Patents, to the end of A.D. 1830.

"In Part II. will be found Abridgments of the Specifications of all the British Patents on the subject, from A.D. 1831 to the end of A.D. 1847, together with a few notices of unpatented inventions and of experiments.

"In Part III. will be given the Abridgments to the end of A.D. 1857; also an Index of Names, and an Index of Subject Matter referring to all three Parts of the work.

"To facilitate the compilation of these Parts into one volume the pages are numbered consecutively throughout.

"It is not the object of this work to compare the merits or originality of the inventions recorded; but in one or two instances of special importance and of national interest, the evidence for and against particular claims has been briefly considered. It must also be borne in mind that these publications are not prepared with a view to their being used to explain doubtful descriptions of an invention: the complete Specification being still the only true guide to the inventor's claims.

"By consulting the Index of Subject Matter in this and the preceding Part it will be observed that several important inventions have been brought forward over and over again as entirely new, at various intervals of time, and it is evident that this might have been prevented, had there been brief and clear records published of everything proposed before.

"It is hoped, therefore, that the publication of these Abridgments will prevent the misapplication of time and labour in the operation of re-inventing what is already known, and by recording the experience of the past will direct the energy of the ingenious to improve upon old plans, and to exercise themselves in new fields of labour. "B. WOODCROFT."

As the book is purchasable for a shilling we shall not take the trouble to review its contents in detail; there are, however, two foot-notes which deserve mention here. The first relates to the early application of steam to the propulsion of vessels, and consists of a letter addressed to the Superintendent of Specifications at the Great Seal Patent-office (Mr. Woodcroft) by Mr. Macgregor, respecting the alleged employment of steam for the purpose by a Spaniard, Blasco de Garay, in the sixteenth century, and setting forth the results of researches made by the writer at Simancas, near Valladolid, in the autumn of last year. The same letter also sets forth the results of similar researches made at Paris, respecting the alleged employment of steam by the Marquis de Jouffroy, towards the end of the last century. Mr. Macgregor sums up his inquiries in Spain and France as follows:—"It appears, 1st, that if Blasco de Garay used a steam-engine to propel a vessel, the evidence of the fact is not afforded by his two letters at Simancas, and is not produced, if it is known there or at Barcelona, by the public officers and others interested in supporting such a claim; 2d, that the Marquis de Jouffroy used a steam-boat in A.D. 1783, but that no description of its machinery is found before that given by himself thirty years afterwards." The second foot-note relates to the propulsion of aquatic animals, and is as follows:—"Mr. Robert Mallet has observed that the Paramecium Caudatum and P. Compressum (Infusoria) propel themselves by paddling with cilia ranged in a spiral groove or sulcus passing obliquely along the body of the animal, or by the progressive vermicular motion of a protuberance traversing the groove like a wave of flesh. (See drawings of these in Ehrenberg's Infusioritherchen, Leipsig, 1838. Taf. xxxix., VII.* and XII.*, and descriptions at pp. 351 and 353.) The diagonal or oblique action of each cilium (or of the wave before mentioned) being resolved into a pressure along the animal's length and another across its body will be found to propel the animal, both by direct pressure (like that of a paddle-float), and by causing the grooved body to rotate, and therefore to progress as if moved by a screw-propeller. Thus the combined action of the paddle-wheel and screw-propeller is exemplified in a microscopic insect as well as in the *Leviathan* steamer."

We must do the author and Mr. Woodcroft the justice to remark that they have taken the hint given in our former notice, and have prominently introduced the words "Excluding Sails," upon the title-page and cover of the Part before us. This will prevent misconception, and is another example of that disposition to study the public interest and convenience only, which characterizes the entire management of the Literary Department of the Government Patent Office.

WRIGLEY'S PATENT FRICTION COUPLING FOR SHAFTING.

At the eleventh Annual Meeting of the Institution of Mechanical Engineers, held on the 28th of January, at Birmingham, Mr. Benjamin Fothergill read a description of Mr. Wrigley's Patent Friction Coupling for Shafting. This coupling, it will be remembered, was described and illustrated at page 202 of our last vol. (No. 1777, for Aug. 29, 1857.) We need not, therefore, repeat its description here. Our article having been transferred to the December number of the *Journal of the Franklin Institute* (Philadelphia, U.S.), the following letter has been addressed to the Editors of that journal by Mr. A. C. Jones, engineer :—

"Gentlemen,—The December number of this journal contains a cut of a friction coupling, said to have been invented by Mr. Francis Wrigley, of England. As it is *exactly* like one of my modifications, *I claim priority*, having deposited a model, specification, &c., in the Patent Office, in the year 1841. Being vexed at their delay and trifling, I withdrew the application ; of course the model has been open to the public ever since. The same year these various plans were explained to Commodore Stockton, and a host of others, at Philadelphia,* Pittsburgh, Cincinnati, New Orleans, &c. During the war with Mexico it was in use on the Government transport Ann Chase,† transmitting the power of her large engines to the paddle wheels. It has been adopted by many others, and I have used it with heavy and light machinery. As it is considered the best coupling extant, and was invented by myself over nineteen years since, and as this is not the first time it has been re-invented by others, I hope for the future that (although it is nearly of legal age) I may enjoy the cheap honour of its paternity. When I have more leisure, I will give one or two other modifications (I have sixteen), in which provision is made for the wear of surfaces, &c.

"I may here refer to another 'bantling' of mine, which within a few years has been claimed in England, and is much used in this country, the source from which it was obtained being ignored. I refer to the application of stay rings around the internal shell or flue of the steam chimney of boilers, and above the shell, in place of the old plan of stay rivets, connecting sheets of iron differently expanded when in use. *Proof*, see *Journal of the Franklin Institute*, vol. xviii., New Series, 1836, p. 91."

* In 1842 the Committee on Science and the Arts awarded to me the Scott Legacy Premium and Medal for this invention.

† The modification here referred to was very nearly like the cut published, except that there was no guard-wheel.

SIR SAMUEL BENTHAM'S INVENTIONS.

The mechanical genius of the late Sir Samuel Bentham, although almost unparalleled in scope and versatility, was scarcely more remarkable than the fidelity, ability, and unwearying industry exhibited since his decease by his excellent relict, Lady Bentham. The volumes of this Magazine, of a few years since, afford copious examples of the wonderful manner in which, while regarding and labouring for the public good, she faithfully kept alive our knowledge of the nature and merits of her husband's numerous inventions; and even very lately the *Journal of the Society of Arts* has not unfrequently contained further proofs of her meritorious efforts. One of her late labours of love was the preparation of a classified catalogue of Sir Samuel's improvements and inventions, which was subsequently published by Mr. Weale, and is now bound up with her Ladyship's Memoir of Sir Samuel in the library of the Commissioners of Patents for Inventions. The preparation of this catalogue must have cost much anxious labour and inquiry, comprising, as it does, a list of vouchers or proofs which demonstrate the reality of the claims involved. Our readers may, then, judge of the indignation with which we observed this selfsame catalogue, printed at length in the pages of a struggling contemporary,* and prefaced by the following statement :—"*We* have on various occasions alluded to the extensive list of inventions and improvements introduced by the late General Sir Samuel Bentham, K.S.G., and have made the following selection therefrom, extending from the year 1773 to 1829, and *we* have classified them, according to the subject, under several heads." If the compiler of the catalogue had been some poor penniless individual, such an appropriation of his labour as this would have excited anger; but when the person wronged is a lady, and that lady the estimable relict of the illustrious inventor himself, we know not how to express our feelings with moderation. We have, as our readers will recollect, before had to deal with plagiarisms; but we believe the present example unparalleled in our experience.

* The *Artizan*.

JACKSON'S PATENT WHEELS, CYLINDERS, AND ROLLERS.

A PETITION has been presented to the Privy Council by Mr. Jackson for the extension of a patent which had been granted to him for improvements in the manufacture and construction of wheels, cylinders, rollers, &c., in 1844, for the period of fourteen years. The ground of the application was that the invention had only been brought into general use within the last few years, and that the patentee had not as yet derived any pecuniary benefit from it.

Mr. Atherton, Q.C., and Mr. Hindmarch supported the Petition. The Attorney-General watched the case on behalf of the Crown. Their Lordships, after hearing evidence in support of the allegations in the Petition, and examining models of the improvements for which the patent was taken out, granted an extension of the patent for six years.

ON THE NECESSITY OF A MOON'S ATMOSPHERE.

BY GENERAL T. PERRONET THOMPSON, M.P.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—The scientific world seems very lightly to assume that the moon has no atmosphere. We know more of the moon than our ancestors did of Australia; but it would have been rash in our ancestors to maintain that there was no atmosphere in Australia, merely because nobody had been there to see.

In the Exhibition of 1851 in Hyde Park, one of the most interesting objects was the representation of portions of the moon's surface as seen by a telescope, the produce of the mechanical and mathematical science of Manchester. It is presumable, therefore, there will be readers of your Magazine who will feel interested in the assertion that the moon must necessarily have an atmosphere, and its density be assignable.

Air, like every other known thing, has weight; that is to say, is subject to the attraction denominated gravitation. And the density of the air on the earth's surface, or at any assigned distance from it, is to be estimated on the same kind of principle as would be applicable to a quantity of cotton wool, where the density of any portion depended on the quantity by which it was pressed from above. But there would be this difference, that air, so far as we have the power of examining, is a perfectly elastic substance, and cotton is not. Whence air, if relieved from any pressure which could be opposed to it, must extend itself to unlimited distances, with unlimited degrees of rarity—which cotton would not.

The Torricellian experiment, as exemplified in the barometer, shows that in average circumstances the weight of the whole atmosphere pressing on any portion of the earth's surface at the level of the sea, is equal to what would be the weight, if such thing there were, of $5\frac{3}{4}$ miles in height, of air which should be everywhere of the same density and weight as the air at the surface of the earth; a thing purely imaginary and for the convenience of possessing a measure, as much as if it were stated that all the salt in the sea if collected at the bottom would be a certain number of feet thick, or that the weight of a mile deep of cotton would be equal to the weight of a certain number of yards of the densest and heaviest which would be found at the bottom. And this creature of the imagination has received the name of "the homogeneous atmosphere."

It is plain that in an atmosphere as actually existing, the densities upwards must diminish rapidly from two causes; first, on the same principle as in the cotton; and, secondly, because when the distances are great (which was not supposed to be the case with the cotton), it becomes necessary to take into the account that the attractive force diminishes in inverse proportion to the squares of the distances from the centre.

But though the densities diminish rapidly, it is equally certain that they never at any assignable distance become nothing. They are matter of arithmetical calculation; and this is the result the calculation gives. There can, therefore, be neither sense nor philosophy in saying, "Who knows but, after all, the calculation may be wrong? so let us assume that the fact is the contrary of what the calculation tells us." If this kind of practice were followed, all human calculations might be given up. The densities may speedily become less than would be competent to a certain assigned purpose; as, for instance, to supporting a balloon, or sustaining life in the creatures which live longest in the receiver of an air-pump. But this is not being nothing, any more than the thousandth or the hundred-thousandth figure in a recurring decimal is nothing. When the process is carried on without assigned limit, the amount approaches to a given sum; but this is in itself the proof that no assignable term is nothing.

But it will probably be urged, that it was not intended to say, the density, at (for instance) thirty of the earth's diameters from the earth, was nothing, but only that it was

so small as to be incompetent to produce any effects. The reply to which is, by demanding proof, or good show of reason, why it should be too small. Does the result depend on the density being of this or that positive degree of magnitude; or is there a cumulative process concerned, by which any density at all, provided it only exists, is competent to the effect?

If it be once admitted that there is a density of any assignable magnitude, however minute, there appears no more difficulty in conceiving this rare atmosphere to be accumulated by any force with such a tendency, than if its rarity was less. The process, if to be begun *de novo*, might be slow, but it could hardly be less certain.

In Dr. Lardner's "Cabinet Encyclopædia" (p. 230) is found stated, that on the surface of the moon "muscular force would go six times as far in overcoming the weight of materials as on the earth." If this may be assumed to mean that at the moon's surface the force of gravitation towards its centre is a sixth of the force under corresponding circumstances on the earth, the point where the earth's and moon's attractions will balance each other will be at something like an eleventh of the way from the moon to the earth. But if the assumption started with be not the correct one, no difference will be made in the argument. There must in any case be a point somewhere, where the attractions will be equal.

Imagine the earth and its atmosphere to have existed before the moon, and at some point of time the moon with its attraction to its own centre to have been called into existence. The inevitable consequence would appear to be, that the moon would begin to attract its share of the surrounding medium, and with all reasonable rapidity form round itself an atmosphere whose final density at its surface would bear to the density at the surface of the earth the due proportion arising out of the circumstances of the case.

At a point, as noted, there would be a balance between the earth's and moon's attractions; but it does not follow that there would be anything like a vacuum at that point. On the contrary, the air at the sides must from its elasticity press in, and reduce the density there to something not very different from the average density at other equal distances from the earth. One tendency of which would be, to prevent the commotions which might otherwise be expected to result from the travelling of this point as the moon moves round the earth.

If the attractive force at the moon's surface be assumed to be a sixth of what it is at the earth's, the density of the atmosphere there must be *less* than in the proportion of one to six. For if the force to the earth's centre were supposed diminished to one-sixth, or the same as the moon's, it would be reasonable to infer that the density at the earth's surface would be diminished in the like proportion. But this would not represent the state of things at the moon; inasmuch as the force to the centre diminishes in the inverse ratio of the squares of the distances from the centre, and the distance of the surface from the centre in the moon is only a fourth of what it is in the earth. Hence, at the distance of one radius of the earth from the surface, the attractive force of the earth would be reduced to a fourth, of the moon to a twenty-fifth; at the distance of twice the earth's radius, in the earth to a ninth, in the moon to an eighty-first; and so on. Which points to a diminution in the weight of the superincumbent parts, as compared with the earth under the supposed reduction of its attractive power to one-sixth; and consequently a diminution in the density at the moon's surface, below the contemplated reduction to a sixth in the supposed case of the earth. All of which it could not be difficult to verify by precise calculation.

The inference from all this is, that astronomical Manchester should be on the look-out for the suggested probabilities; and further, should not attach undue weight to the absence of what may after all be inconsistent with them. For instance, a common objection to the moon's having an atmosphere is, that there are no appearances of clouds. But would an atmosphere of the density intimated be adequate to the support of clouds? What may be called the *weight* of the cloud would be less than on the earth in the same proportion as the attractive force at the surface. But the density of the atmosphere there, would be less in a still greater proportion, and therefore might be inadequate.

It would be only a small step to the surmise, that all the planets and their satellites, and, in fact, all heavenly bodies where the principle of gravitation is in action, must have atmospheres under the same law. Of course, the same may be extended to the sun, if he is not a globe of fire, or under some other peculiarity hostile to the application of the rule. When it is found stated that at the surface of the sun a man would weigh two hundred tons, this must be understood to mean that the attractive force to the centre would be three thousand times what it is on the

earth. And since the radius of the sun is 110 times that of the earth, the diminution of the attractive force at increased distances must be exceedingly slow; thereby causing an increase of the density of the atmosphere at the surface, above the three thousand times which is the augmentation of the attractive force. So that it does not appear impossible that at the sun, cork might fly; or at all events the density might suffice for the elevation of Leviathans of vapours in the guise of spots, besides what may be called chemical results, bearing on the constitution and influences of the sun and fixed stars generally. Or it may present the explanation of the Zodiacal Light, which has the appearance of being caused by substances raised in the sun's atmosphere from the equatorial regions of that body, by the joint action of the density of the atmosphere and the centrifugal force.

If gravitation (as no man doubts) is universal, such consequences seem by a kind of necessity to follow; and there would be no more reason on the face of things, for denying the planet Neptune an atmosphere because it is a long way off, than for denying its dependence on the laws which retain the other planets in their orbits. I am, Gentlemen, yours, &c.,

T. PERRONET THOMPSON.

Eliot Vale, Blackheath, Feb. 10, 1858.

THE WAVE-LINE SYSTEM.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—In No. 1799 of your journal, page 105, you publish a paragraph which has excited considerable interest among your numerous nautical readers. It states that "a ship has been built with two differently-formed bows—the starboard bow with a slight convex curvature, the port bow with a hollow or wave-line curvature of about 10½ inches in 50 feet. The result is, *that when the port bow is on the lee side the ship holds a bad wind, and her speed is less by at least 2½ knots per hour than when she is on the other tack.*"

My inquiries upon this highly-interesting subject have led to my being favoured with a letter which has put me in possession of the ship's name, and established beyond question the truth of the fact which this paragraph discloses. I have also been informed that some highly-important experiments were made in the same ship upon the magnetic needle by a gentleman of nautical and scientific eminence, the results of which would enrich your columns if he would be so kind as to communicate them.

Mr. Moy, in your last Number, in a tone highly creditable to him, eulogises you for publishing the above paragraph. Most of your readers will, no doubt, concur in his eulogy; but I apprehend that very few of them will acquiesce in his mode of accounting for the important fact to which the paragraph mainly refers.

Mr. Moy says, "The fact that the ship holds a bad wind when on the starboard tack simply shows that she was rigged to suit the form of the starboard bow; the hollow bow causes the centre of gravity of displacement to be further aft, and, consequently, the centre of effort of the sails should be further aft also. The helm having to be kept down, of course partly accounts for a decrease of speed when on that tack."

This statement contains an ingenious hypothesis, but it is gratuitous, and may be at variance with the truth. The hollow line does not *necessarily* cause the centre of gravity of displacement to be further aft; a convex curvature may have been given to the other bow of such a character that one side should have the same amount and moment of displacement as the other.

But, waiving this objection, I think it may be demonstrated that Mr. Moy's view of the case is utterly inadmissible.

I regret that I cannot produce the lines of the ship for Mr. Moy's inspection, and that I am not at liberty to publish her name; but the expression "10½ inches in 50 feet" would be sufficient to inform him that she is a vessel of great magnitude. As the indefatigable and talented champion of a theory which facts and even scientific investigation are fast bringing into desuetude, he perhaps owed it to himself to obtain the information which I have obtained with respect to the ship; and, as he has the advantage of a recognised *status* in the scientific world, he might also have procured the drawing by which she was constructed.

The only data which is necessary for my purpose I shall at once submit: it is sufficiently approximative to the truth to enable Mr. Moy to test the value of the arguments I shall adduce in opposition to his opinion:—

Register tonnage	about	2000 tons
Area of immersed midship section when moderately loaded	„	550 feet
Length between perpendiculars	„	230 feet
Displacement with the above immersed midship section	„	1800 tons

Mr. Moy will at once perceive the clipper character of the ship, and be able to satisfy himself, better in all probability than my arguments will be calculated to satisfy him, that his first impression is erroneous.

Suppose, then, this ship to have the two odd bows as predicated: and, to simplify the investigation, assume that the one bow is the counterpart of the other; that is, one bow with a concavity of 10½ inches in 50 feet and the other with a convexity of the same dimensions. It would then require a pad, of a doubly-convex section at the water line, and of an irregular triangular form, tapered from its greatest thickness in all directions to its margin, which would be a mere "feather edge," to fill up the hollow bow and render its contour uniform with the bow on the other side. This pad would be, of course, 21 inches thick at the thickest part. Now, such a pad would be a *fac simile* of the water displaced by the starboard bow in excess of that displaced by the port bow. The number of cubic feet in the pad would not exceed 175, and the displacement be therefore 5 tons of water.

Disregarding increased buoyancy, and conceding all to Mr. Moy that he can require, let us immerse the vessel, with her bows thus made to match, to her original load line. The question is, to what extent has the centre of gravity of displacement been affected by the change?

It will be convenient to assume that the ship has a well-balanced body, and that her original centre of gravity of displacement is at about 112 feet from her stem. The centre of gravity of the added displacement would be at 25 feet from the stem. The distance between the two centres would be 112−25=87 feet. Without affecting anything like mathematical precision, we may conceive of two masses—one of 5 tons and the other of 1800 tons,—the line connecting their centres of gravity 87 feet long, and then we know that

Tons Tons Feet Tons Feet
1800+5 : 87 :: 5 : ·241. That is, the common centre of gravity of both is at a distance of less than 3 inches from the centre of gravity of the larger mass. *So that we are sure the alteration made in the hollow bow would not cause the centre of gravity of the aggregate displacement to shift so much as three inches.*

Mr. Moy will not, I am sure, contend that changing the centre of effort of the sails of a ship 230 feet long, either three inches forward or three inches aft, could possibly affect her speed upon a wind to the extent of 2¼ knots per hour.

The hollow bow of a sailing ship is manifestly opposed to speed when the course is oblique. I have conversed with the masters of such ships, and their reports have been invariably unfavourable to the hollow bow, especially with the wind upon the beam.

But supposing the reports of navigators to arise from prejudice or hallucination, if we look at the operation of ordinary mechanical principles, I do not see how we can avoid arriving at the same conclusion.

Supposing the wind to be a few points abaft the beam, the impelling force *would then be acting upon the ship in a direction which is diagonal to the keel, and would urge her in a direction considerably divergent from the middle line of the ship.* To DRIVE A CONCAVITY AGAINST THE FLUID IS OBVIOUSLY UNFAVOURABLE TO SPEED.

I am, Gentlemen,
Your obedient servant,
NAUTICUS.

SHIPS' RUDDERS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—From the silence of all your correspondents in your last Number respecting the question of "Nauticus," I conclude that either I must have damaged a promising discussion, or "Neptune" must have decided the question proposed. As the latter appears to me to be impossible I feel that I must have done wrong. After the last letter of "Nauticus," in your Number for Jan. 30, I shall not attempt to further dispute the "facts,"—viz., the malady and the cure. At the same time "Neptune's" theory—if his statement deserves the name—appears to me quite insufficient to account for them. I cannot, however, suggest a better, and therefore refrain from offering further remarks upon the subject.

Allow me, in conclusion, to remark that I never contemplated saying anything adverse to the excellence of the motives of "Nauticus," but, on the contrary, expressly stated my confidence therein. I regret that he should have thought otherwise. For my part I sincerely hope he will now favour us with his theory.

I am, Gentlemen, yours obediently,
N. A.

MOY'S EXPANSION STEAM ENGINE.

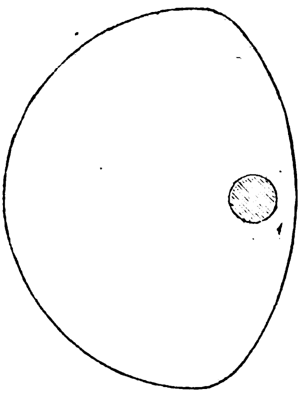
To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I have to thank you for inserting a description of my patent steam engine in your last number. Your printer has unfortunately placed Figs. 13 and 14 upside down, but your readers will, with some little extra trouble, understand it.

Fig. 15 is hardly of the proper shape, and I therefore trouble you with a drawing on a larger scale of that figure; it is formed

by joining a semi-circle and semi-oval

Fig. 15.



together, the major axis of the oval being equal to the diameter of the circle.

I am, Gentlemen,
Your obedient servant,
T. Moy.

1, Clifford's-Inn, Feb. 8, 1858.

[We greatly regret the error pointed out by our correspondent, as well as other defects in the cuts in our last Number, which he kindly refrains from mentioning. A circumstance which we could not control deprived us of the means of affording the illustrations the revision which they so much needed.—Eds. M. M.]

HEAVING-UP SLIPS FOR SHIPS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—I was surprised to see the announcement in your last number (No. 1799) of the intention of Mr. Scott Russell to take out a patent for lateral slips, or the taking up of ships sideways.* When I was in Holland laying down the frigate slip at Rotterdam, sixteen years ago, we used the lateral slips for taking up the Rhine steamers in the narrow canals. I took out a patent in Portugal five years since for the precise thing, as alone adapted for the shoal sand shore of Lisbon, where it was impossible to excavate for the ordinary slips, as the lower end would necessarily be several feet under the level of the sand, and fill in immediately.

The same was required for Oporto.

I had a large model of such a slip in the office of the Director of Works at our Admiralty for two or three years among my various projects for heaving-up slips, and which I withdrew about six months ago.

Besides all this it is the principle of the gun-boat slips at Haslar laid down by me, where the vessels are all carried sideways to their respective stalls.

I am, Gentlemen,
Your obedient servant,
Thos. White.

Portsmouth, Feb. 2, 1858.

* We stated that Mr. Scott Russell *had taken out* the patent.—Eds. M. M.

GUN COTTON.

Captain Norton writes:—"Those who suppose that gun-cotton explodes like detonating powder, such as fulminating silver or mercury, may be convinced to the contrary by throwing a little of the cotton on a fire, where it will explode with a puff; from which I conclude that it may be made to blow an alarm-whistle for railway guards and passengers. 'Bagshot,' in the *Field*, of Saturday, 30th Jan., justly observes that the cartridge-cases of the breech-loader cannot be charged after being fired, because the explosion of gunpowder leaves a damp which prevents the perfect explosion of the fresh charge. It is not so when the cartridge-case is charged with gun-cotton, as its explosion leaves no damp whatever after being fired."

AN IMPROVED BAROMETER.

To the Editors of the Mechanics' Magazine.

Gentlemen,—There is, I think, one considerable fault in all barometers, which is, that while indicating the pressure of the atmosphere, they are also affected by its temperature. Now, if this is a fault, which I think it is, I would propose to remedy it thus:—Let the tube of the mercurial barometer be double and contain a solution of alum, and let the mercury in the vessel be also covered with a thin solution of the same, which, while but very slightly affecting the progress of the light, will keep out the whole of the heat, and thus render the instrument more truly a correct measurer of atmospheric pressure than before. The Aneroid barometer of Conté and Bourbon might be treated in this manner, but it would be far less necessary, inasmuch as the expansion of metal is not the principle here made use of.

I remain, Gentlemen, yours, &c.,
J. A. D.

January 30, 1858.

NOAH'S ARK AND THE LEVIATHAN.

For the information of our readers we have calculated the builders' tonnage of the *Ark* and the *Leviathan*, as that is the only way in which their relative sizes can be ascertained. To find the length for tonnage we have taken three-fifths of the *extreme* breadth from the length between the perpendiculars (mean length), the exact breadth of tonnage not being discoverable. The contractors of the *Leviathan* appear to have made a further deduction—perhaps two and a-half inches per foot—in the height of the counter; but as this deduction is not commonly made in the merchant service, we have not troubled ourselves about the height of the wing transom in the antediluvian monster, and have made but one deduction in both cases. It will be seen that if we are right in taking 21.888 inches as the length of a cubit, our *Leviathan* is the largest ship of which the world has any record.

	Ark. Feet.	Leviathan. Feet.
Length between the perpendiculars	517.2	680.0
„ for tonnage.........	492.48	630.2
Breadth extreme	91.2	83.0
„ for tonnage ...	„	„
Total height	51.72	58.0
Builders' tonnage......	21,788[illegible]	23,092[illegible]

SALT WATER KETTLE.

To the Editors of the Mechanics' Magazine.

Gentlemen,—The following is a description of a kettle for purifying salt water:—It is divided into two chambers, the lower communicating with the top by means of an aperture fitted with a valve opening upwards. The lower chamber may be filled by means of a pipe passing through the upper one and out at the top, and the steam, passing through the valve and collecting in the upper chamber, will be condensed upon the removal of the heat underneath, when the purified water may be drawn off by means of an ordinary tap.

I am, Gentlemen, yours, &c.,

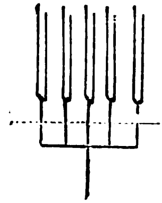
J. A. D.

January 30, 1858.

THE ÆOLIPHON.

To the Editors of the Mechanics' Magazine.

Gentlemen,—I have given this name* to an instrument which I have devised for giving forth musical sounds when placed in water. It is, in fact, a water harp constructed as follows:—A series of tuning forks are firmly fixed into a cross bar, which might perhaps be of wood. The prongs would probably require to be rather longer than ordinary—say nine inches or a foot, and the whole simple instrument could be supported by a vertical rod, as shown, or in any other convenient way.



The water should reach to about the dotted line, and by its motion would cause the prongs to vibrate, the vibrations, of course, varying in rapidity with the strength of the current. Hence the rationale of the sound produced.

I am, Gentlemen, yours, &c.,

J. A. D.

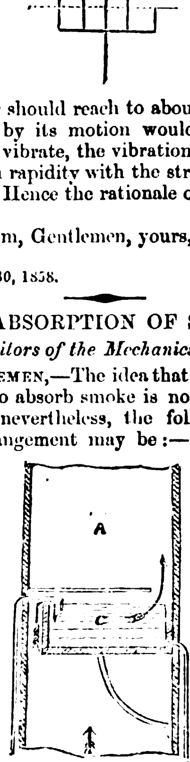
January 30, 1858.

[* Is not a similar, or the same, name already applied to quite a different instrument?—Eds. M. M.]

THE ABSORPTION OF SMOKE.

To the Editors of the Mechanics' Magazine.

Gentlemen,—The idea that water might be made to absorb smoke is not, I believe, original; nevertheless, the following proposed arrangement may be:—A, is a section of a chimney which contains a cistern, C, which is almost covered by the plate above.



There may be two pipes, as shown, the one for the exit and the other for the inlet of the water. Now, the smoke having to pass directly over the water, and that when in a compressed state, it is presumed that the constant efflux of the water will carry away and, I should fancy, absorb a great portion of it. The cistern should, of course, be kept constantly full, and might

be supported as shown. The shape might be various, but I think the greater the depth and surface of the water the better, and that the proximity of the cistern to the side along which the smoke would travel is not too great, as it would serve to compress the smoke and yet permit the draught to rise and follow the direction of the arrow.

I am, Gentlemen, yours, &c.,

J. A. D.

January 30, 1858.

MISCELLANEOUS INTELLIGENCE.

The Mechanical Lap of Luxury.—It was said by Charles Lamb, that "if babies knew how popular they were they would take more liberties than they do." It is obvious that all those inventions which have the comfort and convenience of children as their principal aim are singularly profitable and sought after. No sooner does a man make a fortune with a baby-jumper, and get up higher by its means than even the children themselves, than the race of gain is as successfully run by the perambulator, and now we have to record the appearance of an infant's nursing chair, which will do all the hard work of nursing with a great deal more comfort to the babe, and satisfaction, we feel assured, to the mother or its *bonne*. These chairs are so regulated by springs that the child, when seated therein, immediately feels that its slightest movement is assisted and reciprocated, and that first intuitive desire to spring forward, while in a sitting position, so much delighted in by the child itself, yet so fatiguing to the lap that holds it, is here positively made the medium of both exercise and quietness. The invention is a patent, and a large establishment has been opened by Messrs. Wilson, at 144, High Holborn, for its sale.

Welsh and North-country Coals.—It is gratifying to find that the question as to the fitness of coal for purposes of steam navigation is likely to be thoroughly investigated. At the recent aggregate Meeting of the coal trade, at Newcastle, the Committee directed attention, in their Report, to the results arrived at by the gentlemen deputed to examine the various plans proposed for preventing smoke from the furnaces of marine boilers, and to decide upon which was preferable for effecting this object. These results are of such a nature that the Committee consider it important to ascertain "whether the preference heretofore given to the steam coals from South Wales, and based upon the Government experiments is not only unwarranted, but has been the cause of inflicting great injustice on the Newcastle coal district." They have appointed Mr. Hugh Taylor (Chairman), with Messrs. N. Wood, T. J. Taylor, J. Morrison, H. Morton, T. Wood, and R. P. Philipson, as a special Committee to communicate and act with the Steam Collieries Association, and to consider and report to the General Committee, in order to the adoption of such steps as that Association may see fit to take, to bring the Reports on the consumption of smoke, and on the evaporative powers and values of different descriptions of British coal, under the notice of Government. We may expect, therefore, soon to see the claims of the northern coal to equality, at least, with the Welsh coals, publicly put forward.—*Mining Journal.*

The Society of Arts' Exhibition of Inventions.—Monday, the 5th of April, is fixed for the opening of the Society's Tenth Annual Exhibition of *recent* Inventions. Persons intending to contribute to the Exhibition should communicate with the Secretary of the Society of Arts as soon as possible, stating,—1. The title of the Invention. 2. Whether the article will be a Specimen, Model, or Drawing. Articles for exhibition must be forwarded to the Society's House, Adelphi, London (W.C.), *carriage paid*. The days for receiving articles are,—Thursday, the 18th; Friday, the 19th; and Saturday, the 20th of March; and no articles can be received after the last of these days. All articles should be accompanied with a brief but clear description of the invention, with a woodblock (when possible) for illustrating the Catalogue, and a reference to any publication in which the invention is described. All drawings exhibited must be framed.

Cheap Books for the People.—We have received from J. Macgregor, Esq., one of the Hon. Secretaries of the "Society for the Diffusion of Pure Literature among the People," a catalogue of books of various classes, accompanied by a notice to the effect that by the liberality of one of their number the Committee are enabled to offer, *at half price*, libraries, of 5*l.* worth and upwards, of books from the annexed Catalogue for Working Men's Institutions, and similar bodies, with a responsible Committee or Trustees, on the recommendation of a subscriber. Any person applying for a library should describe the purpose for which it is wanted, and if the grant is passed by the Committee they will forward a catalogue to be marked and returned by the applicant (together with the half-price of the value of the library), when the books will be sent immediately. The catalogue has been compiled with care from upwards

of forty other lists. Considerable expense has been incurred in preparing this Catalogue, in promoting a new system for circulating pure literature in Sunday-schools in the monthly supply of about 20*l.* worth periodicals, at cost price, besides free grants and other special efforts, noticed at page 8 of the Catalogue. An earnest appeal is therefore made to the public, to enable the Society to continue and extend these efforts. The offices of the Society are 9, John-street, Adelphi, London (W.C.).

SPECIFICATIONS OF PATENTS RECENTLY FILED.

CRAWFORD, G. *Improvements in pianofortes.* Dated May 14, 1857. (No. 1363.)

According to one portion of this invention the rest bridge is made of glass, to secure a superior purity of tone. Another modification consists in the use of double sounding boards, in order to increase the volume of sound from the instrument.

SHARROCKS, J. *Improvements in machinery or apparatus for pressing bricks, tiles, and other plastic substances.* Dated May 14, 1857. (No. 1366.)

The patentee causes a surface plate to revolve upon pulleys placed upon studs attached to the main framing of the machine. In the surface plate he fixes moulds within each of which, and forming the bottom is a presser plate, which, with the cover, may have any device thereon, and after the plastic substance has been pressed in the mould, it is, by an arrangement of cams, tappets, &c., forced therefrom, and the operation repeated.

READING, D. *A new or improved spring for carriages or other vehicles.* Dated May 14, 1857. (No. 1367.)

This consists in the use of spiral springs placed within cylindrical chambers (formed in the axle box or boxes), each chamber being fitted with metallic plungers in connexion with the body of the carriage, so as to maintain the springs in a vertical position, and supply reaction.

CARR, J. *Improvements in machinery for hackling flax, hemp, and other fibrous substances.* Dated May 14, 1857. (No. 1368.)

This machine cannot be described without engravings.

BARTHOLOMEW, C., and J. HEPTINSTALL. *Improvements in machinery for rolling tyres and hoops for railway and other wheels, and also other articles made of iron and steel.* Dated May 15, 1857. (No. 1369.)

Machinery is here combined in such a manner that a ring of iron or steel may be expanded or contracted in diameter, and according to the form of roller used, so will be the section of metal produced.

AIZLEWOOD, J. *Improvements in hat and umbrella stands.* Dated May 15, 1857. (No. 1370.)

This consists in introducing into such stands mirrors or glass, forming an integrant part of the design. This combination affords considerable scope for variety of design.

KING, W. H. *Improvements in kilns and stoves.* Dated May 15, 1857. (No. 1372.)

The kilns are made circular, and with an interior wall rising nearly to the top. The fire and heated air rise from the fire-places at the bottom between the two walls, and entering the kiln at the top, pass down the same, out at a central opening at the bottom, along an underground flue, into a flue near the level of the ground, extending along the stove, and thence into the stoves by adjustable dampers. Fire-places may be situated at intervals in the last-named flue to increase the heat of the stove.

WHITAKER, F. *Improvements in the construction of machinery for sewing and embroidering.* Dated May 15, 1857. (No. 1373.)

This consists chiefly in the application to sewing machinery of the mechanical arrangement, or a modification thereof, used in the manufacture of looped fabrics, and known as the needle (or hook) and presser, in combination with an eye-pointed needle for the production of various descriptions of sewing or of tambour work.

WALKER, R. P. *Improvements in machinery for hulling and scouring coffee and similar substances.* Dated May 15, 1857. (No. 1374.)

This invention cannot be described without engravings.

WHITESMITH, I. and W. *Improvements in weaving.* Dated May 15, 1857. (No. 1375.)

This relates to looms for weaving, and is applicable partly to the production of plain, but more particularly to fancy fabrics, such as checks and twills. The specification of this invention is far too lengthy to admit of an intelligible description in our pages.

CARTER, D. *Improvements in machinery or apparatus for cleansing the waste of woollen or other fibrous manufactures, or for recovering the wool or other fibres from such waste substances or materials.* Dated May 15, 1857. (No. 1377.)

This consists in the use of a hollow perforated cylinder, capable of rotating upon its axis. Another cylinder is also used, the

external surface of which is studded with prongs or points, and capable of rotating upon its axis within the first-named cylinder, and concentrically with, but in a contrary direction. Openings are provided in the outer cylinder to supply the substances to be operated upon, the perforations of the former allowing the dirt to escape.

GRIPPER, E. *Improved machinery or apparatus for washing, drying, and cleansing corn, seed, Egyptian beans, and other pulse.* Dated May 15, 1857. (No. 1378.)

The patentee washes the grain, &c., in a cylindrical vessel, constructed of wire sieving, &c., and revolving in an inclined position in a tank partly filled with water. The grain is carried forward by arms or ledges fixed on the rings forming the cylindrical vessel, and is discharged into a receiver with a false bottom, into which the elevators work, the buckets of which are perforated. The grain being received into the trough from the elevators is driven along by an Archimedean screw, and the bottom of the trough being perforated, a constant drainage takes place, when it is discharged into tubs, which also have false bottoms to assist further drainage. These arrangements are sometimes modified. For partially drying the grain, he uses an ordinary drying cylinder, with an iron chamber inside, to which is given a centrifugal motion. In the interior of this chamber he fixes an Archimedean screw on oblique arms, set so as to revolve at a different speed from the cylinder, by which they act by slight pressure on the grain. When highly-dried grain is required, he admits into the chamber a blast of highly-heated air. For cleaning grain, &c., which cannot be subjected to the action of water in the cylinder without damaging it, he passes it between rollers covered with india-rubber, &c., and thus crushes the dirt without injuring the grain, which may afterwards be smutted.

SANDS, S. *Improvements in the manufacture of fringes.* (A communication.) Dated May 15, 1857. (No. 1379.)

Here a vertical warp is employed for the making of each fringe, and for opening and closing the sheds of warp guide or warp bars are used (such as are employed in lace machines), and actuated by jacquard cuts of wheels or other pattern surfaces.

BROOMAN, R. A. *Improvements in the construction of oil cans.* (A communication.) Dated May 15, 1857. (No. 1381.)

This invention was described and illustrated at p. 510 of No. 1790, Vol. 67.

BROOMAN, R. A. *Improvements in machinery to be employed in the refining of sugar.* (A communication.) Dated May 15, 1857. (No. 1382.)

This refers to certain arrangements of centrifugal machinery for purifying sugar, and for separating the granular from the liquid portions thereof. Also, to certain sets of fluted rollers for breaking up and mixing with clarifying liquor lumps or cakes of raw sugar.

PARKER, F. *An improved tell-tale for public vehicles.* Dated May 15, 1857. (No. 1383.)

This consists in apparatus for checking the number of passengers travelling by a vehicle, and consists of a tube descending to a bell contained in a case. When set in motion a globular missile descends from the upper part of the tube and strikes the bell, either by contact with the sounding surface or by acting on a trigger.

JONES, H. *An improvement or improvements in engines for raising beer and other liquids.* Dated May 16, 1857. (No. 1386.)

This consists in connecting with the joint in which the arm turns, by which the engine is worked, a hollow case, which covers the slot in the counter to which the arm is attached, and into which case the short end of the arm rises when the arm is depressed.

TRAPPES, H. *An improvement in the construction of a sliding drawer, applicable to all steam engines, either fixed or locomotive, for the distribution of steam, aeriform, or liquids, used either as a motive power or for any industrial or artistic purpose.* (A communication.) Dated May 16, 1857. (No. 1387.)

The lips or edges of the drawer or slide valve heretofore used usually bear upon a surface, and are parallel to the motion of the drawer or slide valve. Here the lips or edges thereof surround it, and are perpendicular to the direction of its motion, and the steam chest is divided into three compartments, the centre of which communicates with the steam escape or exhaust, and the two extreme compartments introduce the steam.

CRESWELL, G. H. *Improvements in apparatus for supplying ink or other mixture for stamps used in stamping letters and other articles.* Dated May 16, 1857. (No. 1388.)

This consists in applying ink to the pads mechanically, and so as to ensure a surface properly dressed with ink. It also protects the ink from contact with the air, and thus obviates the tendency of the ink to thicken and harden. The object is accomplished by means of a cylinder enclosed in a case, with which it is in close contact, except at the

sides, where a cavity is formed to receive the ink or mixture.

ELLIS, J. *Improvements in the manufacture of artificial stone.* Dated May 16, 1857. (No. 1389.)

The patentee claims the manufacture of artificial stones—1st. By mixing powdered marble shells, calcined bones, granite, porphyry, malachite freestone, &c., with lime and a solution of silicate of potash, or silicate of soda, or both, so as to form a paste, which is afterwards shaped in moulds. 2d. By mixing together lime and carbonate of lime in fine powder or flour, with or without the addition of other stone, or burned clay, &c., and slightly damping the mixture, and submitting it to pressure in moulds.

COWPER, C. *Improvements in preparing solutions and extracts of the colouring matter of madder and other tinctorial substances for dyeing and printing.* Dated May 16, 1857. (No. 1390.)

The madder is first reduced to powder, freed from salts, sugar, gum, and mucilage, by treating it with water, which, after the maceration of about a day, may be squeezed out. Or water acidulated by acid may be employed. The acid mixture may be heated to the boiling point, which is afterwards drawn off by filtration, and the residue is washed until the last washings are no longer acid. The madder thus purified is ready for the second process.

BRADLY, R., and W. CRAVEN. *Improvements in machinery or apparatus for making bricks and tiles.* Dated May 16, 1857. (No. 1393.)

This relates to a previous patent of the patentees, dated 1st July, 1853, and consists mainly in the use of a compressing piston in conjunction with the rams or pistons contained in the moulds of the revolving table or platform, which are used for discharging the compressed brick.

BODMER, R. *Improvements in locomotive steam engines.* Dated May 18, 1857. (No. 1394.)

This consists in the use of a throttle or other valve in the exhaust pipe of locomotives, by which the exhaust pipe can be either partially or wholly closed, the escape of the off-steam impeded or prevented, and by the back pressure thus produced the speed of the driving wheels regulated. The engine driver is by the use of this valve enabled to prevent the wheels from spinning round on starting the train, or in wet weather to moderate the velocity of the train in going down an inclined plane.

NEWTON, W. E. *Improvements in the manufacture of boots, shoes, and other coverings for the feet.* (A communication.) Dated May 18, 1857. (No. 1397.)

This consists in fastening with cement to the inner sole and welt a vulcanised india-rubber sole and heel, made in one piece, the inner sole and welt being attached in the usual manner.

APPERLY, J., and W. CLISSOLD. *An improvement in carding engines, and in condensers applicable thereto.* Dated May 18, 1857. (No. 1398.)

This relates to the doffing end of carding engines, and is intended to prevent the accumulation of "flight" upon the doffer doffing comb, and comb bar, and the irregularities in the sliver caused by the occasional addition of these accumulations, and also by the regular division of the carded fibres as they are being doffed into sliver, is avoided. It requires engravings to illustrate it.

ROYS, T. W. *Improvements applicable to explosive shells.* Dated May 19, 1857. (No. 1402.)

This consists mainly in forming grooves on the sides of elongated shells so that a portion of the fire from the charge may escape along the side thereof, and ignite a fuse, through an opening in the sides of the shell.

REEVES, C. *New or improved grinding and polishing machinery, to be used in the manufacture of knives, matchets, swords, and other similar articles.* Dated May 19, 1857. (No. 1403.)

Here the grinding and polishing is effected by means of a drum having a slow rotary motion (to which the articles to be ground or polished are fixed) in combination with a polisher having a rapid rotary motion.

COWPER, E. A. *Improvements in furnaces for heating air and other elastic fluids.* Dated May 19, 1857. (No. 1404.)

The air is heated by means of regenerators, in which the same passages are employed alternately for the products of combustion and the air to be heated. The regenerator consists of a chamber filled with fire bricks, &c., having interstices between them for the passage of the air or products of combustion. The regenerator is inclosed in an air-tight case of iron, lined with fire bricks.

VON SPARRE, J. F. P. L. *Improvements in separating substances of different specific gravities, and in the machinery and apparatuses employed therein.* Dated May 19, 1857. (No. 1405.)

This consists of four machines for separating substances of different specific gravities, in all of which water is employed either as a medium through which the substances fall under the action of gravity, or as an agent for facilitating the motion of portions of the substances along inclined surfaces.

Whitehead, W. *Improvements in cards for Jacquard mechanism.* Dated May 19, 1857. (No. 1407.)

The cards, which may be of wood or metal, are perforated throughout to correspond to the whole of the needles in the jacquard, and when required for any particular pattern the holes are plugged up to suit the particular design to be produced.

Burton, J. W., and G. Pye. *An improvement in pressing and crushing flax, hemp, and other fibrous substances.* Dated May 19, 1857. (No. 1409.)

This consists in the use of rollers the surfaces of which are composed of a series of metal rings pressed outwards by springs. Each of such rollers acts by preference with a roller having a solid surface.

Rowland, M. B. *Improvements in soap and detergent preparations or compounds.* Dated May 19, 1857. (No. 1410.)

The patentee claims the combination with saponaceous matters of ammonia, or certain of its compounds or salts, together with turpentine, mineral or coal tar, naphtha, camphine, benzole or other analogous substances, for producing soap, &c.

Harrison, C. W. *Improvements in obtaining light by electricity.* Dated May 20, 1857. (No. 1412.)

The patentee obtains electric light by causing electricity to pass through, decompose, or vaporise compounds of metal with other elementary bodies, such as the metallic oxides, chlorides, fluorides, sulphides, &c., whether found in nature or prepared artificially, also the metallic salts, both acid, alkaline, and neutral.

Hardley, J. *An improved apparatus for bruising and grinding vegetable substances.* Dated May 20, 1857. (No. 1413.)

This consists of a drum having a furrowed periphery, and revolving within a concave, the inner surface of which is also furrowed, the furrows of the cylinder by preference being straight and parallel to its axis, while the furrows of the concave are inclined thereto. The substance to be acted upon is fed on to the top of the revolving drum, and is carried round between the two indented surfaces, which cut, bruise, grind, and deliver it.

Foulkes, A. *Improvements in sewing or pointing gloves, and in machinery for such purposes.* Dated May 20, 1857. (No. 1414.)

This consists in ornamenting the backs of gloves by a sewing machine, by means of the addition of a groove in which the seam previously made moves along while the stitching is being done.

Lethuillier, L. *An improved machine for moulding and compressing bricks, tiles, and other articles made of soft materials.* Dated May 20, 1857. (No. 1420.)

This invention cannot be described without engravings.

Harrison, J. *Improvements in railway signals.* Dated May 20, 1857. (No. 1422.)

This relates to junction signals, and consists in connecting the signals with the switch levers so that the act of setting the switch throws the signals into such a position as to prevent any train advancing but that for which the switch is set. In order that the switches may be worked indepedently of the signals when required, the rod passing under the signal post is not permanently fixed to the switch lever, but is attached by a clutch.

Abbot, J., jun., R. H. Thomas, J. Young, and J. E. Hunt. *Improved machinery for blooming iron.* Dated May 20, 1857. (No. 1423.)

This combines various improvements with the view of facilitating the delivery of the ball into the machine, its passage through the machine, and the discharge of the scale and refuse matters from the concave beds. The invention cannot be described in detail without engravings.

Jakens, J. *Improvements applicable to printing and dyeing woven fabrics and fibrous materials.* Dated May 20, 1857. (No. 1424.)

This relates to a material which may be used as a substitute for the acetate or other salts of iron now employed as mordants, viz., the refuse material arising from the manufacture of sulphuric acid when that substance is obtained from pyrites.

Clark, W. *Improvements in the preparation of the colouring matter, called murexide.* (A communication.) Dated May 20, 1857. (No. 1427.)

The patentee submits alloxantine in a powdered state, or in crystals, to contact with gaseous ammonia. It is according to the concentration of the ammoniacal gas employed that the transformation of the alloxantine into murexide is effected more or less rapidly. In order to obtain a perfect result it is essential that humidity be excluded as much as possible during the action of the ammonia on the alloxantine.

Kemp, E. C. *Improvements in chandelier or other pendent gas-lights, and in the fittings for the same.* Dated May 20, 1857. (No. 1428.)

These relate, 1st, to glass globes or shades, and the galleries for supporting them. The pan or curtain (from which the glass drops are usually suspended) is formed in one piece with the shade, and is supported by an internal ring, resting on the burner,

which is hidden from view, while less shadow results. 2d, A pendent burner having an enclosed light only is used; this is suspended by the gas tube. The light is placed within a glass globe and shade or reflector combined. The globe is in two pieces, separated horizontally, with the upper or lower part fitted so as to slide up and down for lighting, &c.

OWEN, W. *Improvements in machinery or apparatus for stretching woven fabrics.* Dated May 21, 1857. (No. 1432.)

To the endless chain of the stretching machine the patentee affixes holders to hold both edges of the cloth. The holders are made to open as they pass to and from the chain pulleys, by a spring from which they are released as they advance on and off the material to be stretched, and they are closed by a spring attached to each of them. The greater the pull or stretch of the material the tighter it is held. A curved or serpentine form is also given to the race at each end, to receive and deliver the cloth.

TODD, W. *Certain improvements in the treatment of yarns or threads, and in the apparatus for performing the same.* Dated May 21, 1857. (No. 1434.)

This applies to the wetting of yarn (principally to yarn in "cops") prior to weaving. The improvements consist in the application thereto of hydraulic pressure.

HACKWORTH, J. W. *Improvements in machinery or apparatus for forcing, lifting, and exhausting æriform bodies and liquids, applicable to blast furnaces.* Dated May 21, 1857. (No. 1438.)

This relates to blowing apparatus, and consists under one modification of a columnar framing within which is a steam cylinder inverted. The piston rod works out through the lower end cover, and is connected with the usual crank shaft running in bearings in the base of the framing. A piston rod also works through the upper cover, being connected to the piston of the air blowing cylinder, which thus has a vertical traverse given to it. This piston is fitted to the blowing cylinder, which has also a vertical traverse, instead of being stationary, and is closed at each end, but has near each end a ring of lateral openings in it. It is turned true exteriorly, and is fitted into a species of annular chamber, or air receiving duct, fixed upon the top of the columnar framing, which duct has a branch passing to the blast furnaces. The motion of the cylinder is derived from cranks on the shaft below.

DRUKKER, M. *Improvements in apparatus for indicating the passage of time.* Dated May 22, 1857. (No. 1440.)

This relates to a method of indicating time at night or any other time, by means of a shadow passing over a scale having spaces marked off to represent hours, &c., corresponding with the distances which the weight which gives motion to a clock descends in certain times.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

STEVENSON, J., jun. *Improvements in lighting apartments and passages.* Dated May 14, 1857. (No. 1364.)

This relates to the use of polished tile or porcelain surfaces, for transmitting daylight into dark apartments.

HOLLINGWORTH, E. *Improved machinery or apparatus for washing linen and other articles.* Dated May 14, 1857. (No. 1365.)

This consists in combining a rotating reel with a series of brushes, sponges, &c., fixed to the inside of a casing in which the articles to be washed are placed and held upon the rods of the reel, the rotation of which brings such articles into contact with the brushes, &c.

VANDERBORGHT, M. J. *A new system of machinery producing simultaneously the threefold effect of casting, breaking-off, and rubbing (smoothing) of printing characters.* Dated May 15, 1857. (No. 1371.)

Following out the principle of the old hand-mould, the inventor arranges a mechanical mould thus: instead of the two pieces forming the body of the letter being moveable, and those called blanks which form the thickness firmly attached to the moveable pieces, he proposes to attach the two pieces forming the body of the letter, and to render the blanks moveable.

SCHMIDT, H. *A new apparatus for advertising in railway carriages, omnibuses, cabriolets, and other vehicles, and in theatres and public places.* Dated May 15, 1857. (No. 1376.)

This consists of a closed box in which a number of rollers are placed, round each of which a band of prepared cloth is rolled on which the advertisements are printed.

MARRIOTT, W., and D. SUGDEN. *Improvements in heating press-plates for pressing woollen, worsted, cotton, silk, or other fabrics, paper, and other articles.* Dated May 15, 1857. (No. 1380.)

Here super-heated steam is passed into a steam chest containing the plates to be heated.

BROWN, H. *An improved material resembling ivory.* Dated May 15, 1857. (No. 1384.)

This consists in preparing woods (par

ticularly box or lance wood) by first steeping the same in a solution of carbonate of soda. They are next washed in clean water, and then steeped in a solution of chloride of lime, and afterwards polished with white wax and chalk.

RAMIE, C. W. *A mode of attaching handles to table cutlery.* Dated May 16, 1857. (No. 1385.)

The inventor makes use of an elastic split, or divided tang, attached to the knife blade, &c. The points of this tang, when at liberty, separate, but admit of being pressed together, so as to enter the contracted entrance of a cavity formed in the handle (which may be filled with cement), which cavity allows them, after having passed the entrance, to expand, thus securing the handle, and preventing its twisting upon the tang.

OGLE, N. *An improved method of propelling and ventilating ships.* Dated May 16, 1857. (No. 1391.)

This invention was described at p. 14 of our last volume.

HILL, W. *Improvements in railway brakes.* Dated May 16, 1857. (No. 1392.)

This consists of a duplex stop catch apparatus fitted up upon holding pulleys or discs fast upon the axles of the railway carriages, so as to enable the brakesman to convert all the wheels in a train into frictional retarders.

AVERY, J. *Improvements in mills for grinding corn and other like substances.* (A communication.) Dated May 18, 1857. (No. 1395.)

This consists in submitting the heated vapour arising from newly ground flour, &c., as it issues from between the stones in a somewhat damp state to the action of warm air, so as to prevent the sudden condensation of such vapour by contact with cool surfaces, and its combination with the stive or dust.

PULVERMACHER, J. L. *Improvements in pipes or tubes for smoking.* Dated May 18, 1857. (No. 1396.)

This refers to a previous patent of the patentee, dated 4th Dec., 1852, and consists, chiefly, in connecting with a pipe a supply tube for containing a reserve of tobacco, which tobacco can be pressed forward into the pipe by simply turning the mouth-piece. It is so arranged that the smoke does not pass through the tobacco in the supply tube in its passage to the mouth of the smoker.

CLARK, W. *Improvements in the manufacture of silk, and in the machinery used therein.* (A communication.) Dated May 18, 1857. (No. 1399.)

This relates, 1st, to a machine for winding raw silk, the principal feature in which is that the reels or battens carrying the raw silk, and from which it is wound, are stationary. 2d, to doubling silk. The bobbins from which the silk is to be taken are arranged side by side in pairs on a frame, and placed on spindles, on which they are free to rotate as the silk is drawn off. 3d, to spinning or twisting silk. During this operation it is wound from the bobbins, and delivered on to reels. The bobbins—say the bobbins that have received the doubled silk in the last machine—are placed on spindles, to which rotatory motion is communicated by straps or bands.

CARNABY, J. *An improved registering index for gas and other meters.* Dated May 19, 1857. (No. 1401.)

On the shaft driven by the worm shaft in gas meters, the inventor places a wheel with one tooth. This drives a second wheel, so toothed as to make one-tenth of a revolution when the first has made one. On the second wheel he makes one of the teeth thicker than the others, so that it may project beyond the surface of them, and work a third wheel in the same manner that the first wheel works the second, and so he continues from wheel to wheel for as many as may be required. To express the quantity by other than decimal proportions, he uses other wheels suitable for the purpose.

HOPE, J. *An improved screw nut and ratchet brace for working the same.* Dated May 19, 1857. (No. 1406.)

This consists in forming screw nuts cylindrical on the outside, and plain or grooved in a line parallel with the axis thereof. The ratchet brace consists of a lever with forked ends, in which is fitted a moveable tongue to clasp the nuts, and turn them as required.

OTT, J. U., and F. A. M. UDLOFF. *Improvements in ruling paper, and in the pens or instruments for the same.* Dated May 19, 1857. (No. 1408.)

Here lines of various colours can be ruled at the same time, so that each alternate line may be of a different colour, or the colours may be arranged in any order required. The pens are each made of a distinct piece of metal folded or doubled in the direction of its length, and more or less closed at the point to make a line more or less fine. The metal is left more open higher up to afford capacity for the ink, which also permits it to flow freely to the point.

CORNIDES, L. *Improvements in the manufacture of gelatine and glue.* Dated May 19, 1857. (No. 1411.)

This consists in extracting gelatinous matter from animal substances by means of a solution of glycerine. The inventor steeps the substances in water, and when soft, and after being washed, he adds a mixture of water and glycerine. This mixture is subsequently boiled and strained.

INGWERSEN, P. *A certain remedy to prevent and dissolve the deposits in boilers and steam generators.* (A communication.) Dated May 20, 1857. (No. 1415.)

The inventors make use of Burgundy pitch, either by itself, or mixed with one-third charcoal soot, or pure soot, to be applied in the boilers whilst heated.

USHER, A. A. *A new or improved moderator lamp.* Dated May 20, 1857. (No. 1416.)

This lamp consists of two chambers, one within the other. The piston which raises the oil is in the inner chamber, and by its descent forces the oil through holes in its bottom into the outer chamber, from which it rises to the wick. Between the outer chamber and the wick the oil passes through a valve, and a screw taper plug in the valve regulates the supply of oil to the burner. The wick of the lamp is made of asbestos, and the burner with several tubes passing through the centre to admit air to pass through.

KEOGH, H., and F. A. *Lighting the public gas lamps in the cities and towns of Great Britain and Ireland by electricity, and for turning off and on the gas to same simultaneously.* Dated May 20, 1857. (No. 1417.)

An electric wire is led from the road to each lamp-post. At the point at which it approaches the gas burner, a small piece of platinum, iron, or steel will sever it, but be connected to it. The current of electricity encountering resistance at each of these pieces of metal will produce a spark, which will ignite the gas when turned on.

KNIGHT, T. *An improved cutter and cultivator of land.* Dated May 20, 1857. (No. 1418.)

The inventor makes an implement with cutting knives and teeth, which can be regulated to cut any required depth. A leverage wheel runs within two feet of the front of the implement, and knives which will cut from 1 to 12 ins. in depth are provided. Cultivating teeth are employed, and can be regulated by a wheel to any required depth. There is also a lever for throwing the teeth in and out of gear. There are nine knives in front, which cut 5 ins. apart, and cultivating teeth in proportion. The invention cannot be wholly described without engravings.

ALDIS, E. *Improvements in cramps for flooring and other purposes.* Dated May 20, 1857. (No. 1421.)

The improved cramp consists of a metal plate, which, when used in laying flooring, rests on the joists. On the under side of this plate are two projections, between which one of the joists passes. One comes directly in contact with the side of the joist, and the other carries a stop, which bears on the under side of it. Working between guides in the plate is a pusher, by which the flooring boards are forced together.

TOZER, J. H. *Improvements applicable to travelling caps and other coverings for the head.* Dated May 20, 1857. (No. 1425.)

This consists in the use of an air cushion fixed to the sides of the caps, &c., so as to form an elastic pad to protect the head from concussion, and allow the head to be rested without inconvenience.

CLARK, W. S. *Improvements in machines for cleaning and polishing knives.* (A communication.) Dated May 20, 1857. (No. 1426.)

This consists in the use of two elastic polishing rollers in combination with a stationary trough.

KEMP, E. C. *Improvements in unions for gas pipes and other pipes or tubes.* Dated May 20, 1857. (No. 1429.)

These consist in forming one part of the coupling with a square hexagonal recess, and the other with a projecting part to correspond, whereby the one part is adjusted and prevented turning round upon the other, or altering its position while screwing on the cap.

HOPKINS, J., and G. PEARCE. *Improvements in trucks.* Dated May 21, 1857. (No. 1430.)

This consists of an arrangement of trucks which run on rollers instead of wheels.

FONTAINEMOREAU, P. A. L. de. *Certain improvements in the processes for detaching or separating calcareous rocks.* (A communication.) Dated May 21, 1857. (No. 1431.)

In the rock is drilled, by the ordinary instruments, a cylindrical aperture of about six feet in depth, into which is introduced an acid capable of acting on carbonates of lime. The acid dissolves by degrees the calcareous substances, and forms at the base of the bore a cavity. This is charged with blasting powder, and fired by the ordinary methods.

BLACKLIDGE, W., jun., and G. READ. *Certain improvements in the construction of churns, which said improvements are also applicable to other agitating or stirring apparatus.* Dated May 21, 1857. (No. 1433.)

These consist in placing a beam or pillar in the centre of a vessel, into which the inventors pour the cream (suppose), the said beam having grooves running along its sides, into which place are sliding bars having fixed at right angles to their lower end segments of discs or rings perforated, forming when together, as it were, a complete but disconnected piston to work in the vessel. This piston is so worked by levers in connexion with cranks, pulleys, &c., that they shall pass each other alternately in their ascent or descent.

FOSTER, W. *Improvements in the making of worsted and woollen yarn.* Dated May 21, 1857. (No. 1435.)

This consists in the manufacture of a peculiar chain twist in yarns of mohair, alpaca, worsted, silk, &c. The yarn is first spun in the ordinary manner, then spun a second time, the twist going on the same way, after which the threads are doubled in the ordinary doubling frame. The yarn is afterwards freed from the loose fibres, and allowed to remain in a hot bath, after which it is partially untwisted, secured, stretched, and dried, and a chain twisted yarn results.

BEECH, W. *Improvements in generating and applying motive power.* Dated May 21, 1857. (No. 1436.)

This relates to the use of an exhauster, which is to produce a vacuum on one side of a piston in a closed cylinder, operating in conjunction with valves and connexions for permitting the free action of the atmospheric column, or of the expansive force produced from confined and rarified air or vapour from the opposite side.

NEWTON, W. E. *An improved method of sewing or stitching fabrics together.* (A communication.) Dated May 21, 1857. (No. 1437.)

This principally consists in making a stitch with a single thread, by throwing a shuttle and thread through a loop formed from the same thread, thereby knotting each stitch.

TAYLOR, J. G. *Improvements in writing materials.* Dated May 22, 1857. (No. 1439.)

This cannot be described without engravings.

MURATORI, C. *Obtaining a new sort of white by silicate of magnesia and carbonate of lead, in the first case a composition of zinc, and in the second a composition of lead.* Dated May 22, 1857. (No. 1441.)

The inventor uses silicate of magnesia and oxide of zinc, or silicate of magnesia and carbonate of lead. In the first case it is to put it in the place of oxide of zinc, and in the second case to put it in the place of carbonate of lead or ceruse.

SAMUELSON, B. *Improvements in safety apparatus for giving artificial light.* Dated May 22, 1857. (No. 1442.)

The inventor admits air for combustion into, and discharges the products of combustion from, candle lanterns through wire gauze, similar to that of the Davy lamp, so that such candles and lanterns may be used in mines, &c.

PROVISIONAL PROTECTIONS.

Dated December 8, 1857.

3038. William Jones Ward, of Chorlton-on-Medlock, Manchester, chemist. Improvements in dyeing and printing textile fabrics and materials, and in apparatus connected therewith.

Dated January 15, 1858.

68. John Macintosh, of Aberdeen, engineer. Improvements in apparatus for the manufacture of articles of confectionery.

Dated January 19, 1858.

86. Vital De Tivoli, of Lower Thames-street. An improved omnibus.

Dated January 20, 1858.

95. Robert Martin, of Glasgow, superintendent. Improvements in machinery or apparatus for effecting the shipping of minerals in tidal situations.

97. William Muir, of Strangeways, Manchester, engineer. Improvements in stands for letter copying presses and other small machines.

99. John Dyson, Edwin Wilkinson Shirt, and Henry Shirt, Steel Rollers, of Tinsley Works, near Sheffield. An improved construction of spring for resisting sudden and continuous pressure.

101. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., patent agent. Improvements in the preservation of animal and vegetable substances. A communication from G. Blondin.

103. William Conisbee, of King-street, Southwark-bridge-road. Improvements in printing machines.

Dated January 21, 1858.

105. James Henry Wheatley, of Jacob's-well, Barbican, City. Improvements in printing machines.

106. William White, of South Shields, iron founder. Improvements in machinery or apparatus for making moulds or matrices employed in casting metals.

107. Thomas Ivory, of Edinburgh, advocate. Improvements in steam boilers.

109. James Murdoch, of Staple-inn. Improvements in breaks for railway and other carriages. A communication from J. H. Clement, of Paris.

110. Peter Wilson, locksmith, Samuel Northall, ironmonger, and Thomas James, retail brewer, all of Birmingham. Improvements in locks and latches.

111. Edward Rawlins, of Birmingham, manufacturer, and John Briden, of Aston-juxta-Birmingham, machinist. A new or improved method of working stamps used for stamping or raising metals, and other such like purposes.

112. Henry Smith, of Brierley-hill Iron Works, Dudley, manufacturer. An improvement or improvements in the manufacture of iron hurdles and fencing.

113. John Staite Brown, of Cirencester, miller. Improvements in mills for grinding corn or other substances.

114. William Clark, of Chancery-lane. Improvements in lubricating apparatus. A communication.

115. Hyacinthe Hermagis, of Paris, optician. Improvements in stereoscopes.

Dated January 22, 1858.

116. William Matthew Raine, of Bucklersbury, city, gas fitter. Purifying and increasing the illuminating power of gas.

117. William Blackett Haigh, of Oldham, machine maker, and Joseph Cheetham, of the same place, cotton spinner. Improvements in valves for steam-engines and in super-heating the steam.

118. James Brown, of Coventry, ribbon designer. Certain improvements in looms.

119. James Brown, of Coventry, ribbon designer. Certain improvements in Jacquard machines.

120. William Basford, of Longport, Stafford, brick manufacturer. Improvements in kilns or ovens for burning or firing bricks, tiles, pipes, and pottery or earthenware, and in the mode of charging the ovens or placing or setting the articles that are to be fired therein.

121. Alfred Sterry, of the Gorwydd Colliery, Swansea. Improvements in safety lamps.

122. William Weild, of Manchester, machinist. Improvements in machinery for winding yarn or thread on to bobbins, spools, cards, or other similar surfaces.

123. Thomas Walton Mellor, of Ashton-under-Lyne, cotton spinner. An improved apparatus for measuring water and other fluids.

Dated January 23, 1858.

124. Nicolas Augustin Drouet, chemist, and Pierre Philippe Le Coq, gentleman, both of Paris. Improvements in treating chloride of sodium for obtaining therefrom certain useful products.

126. John Samwells, of Dunstable, Bedford, hat manufacturer, Charles Henry Jones, of Leeds, engineer, and Christopher Pickard, of Leeds, engineer. Improvements in blocking and shaping hats, bonnets, and other coverings for the head.

127. John Gordon, of Railway-place, Fenchurch-street, engineer. Improvements in machinery or apparatus for pulping coffee.

128. James Johnston, of Paisley, manufacturer. Improvements in bonnets, caps, and other coverings for the head.

129. Charles Burn, of Blomfield-crescent, Paddington. Improvements in the manufacture of iron cables and chains, which improvements are applicable to the manufacture of gold and other chains.

130. Jonas Craven, of Bradford, York, designer, Wignall Hey, of Manningham, near Bradford, mechanic, and Charles Worsnop, also of Manningham, overlooker. Improvements in actuating rotary shuttle boxes of looms.

131. Elijah Slack, of Glasgow, manufacturing chemist. Improvements in the treatment or preservation of potatoes and other amylaceous vegetable substances.

132. Joseph James Welch and John Stewart Margetson, of Cheapside. An improved expanding or folding travelling bag or wallet.

133. Jean Jacques Huber, of Boulevart Montmartre, Paris, jeweller. Improvements in the construction of brooches, bracelets, pins, and other articles of jewelry.

Dated January 25, 1858.

134. Arthur Wall, of the East India-road, Poplar, chemist. An improved lubricator for the moving parts of machinery.

135. George Edward Dering, of Lockleys, Hertford. Improvements in the permanent way of railways.

Dated January 26, 1858.

136. Jeremiah Garnett, of Otley, York, paper manufacturer, and Peter Garnett, jun., of Cleckheaton, same county, machine maker. Improvements in the manufacture of felt.

138. Sir Henry Stracey, of Rackheath-hall, Norfolk, Baronet. An improved cartridge.

140. William Edward Newton, of Chancery-lane. A new or improved fabric intended principally as a substitute for leather. A communication.

142. Luigi Ferrari Corbelli, of Florence, Commander of the Order of Malta. A new or improved process for obtaining aluminium. Partly a communication from V. Riatti, of Modena.

Dated January 27, 1858.

146. Thomas Mottram, John Edwards, and Joseph Mitchell, of York, engineers. Rolling steel, iron, and other metals, and also for tilting the same for cutlery and other purposes.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," February* 9, 1858.)

2522. J. G. Jennings. Improvements in the manufacture of articles used for forming flues, and air and water passages in buildings.

2529. J. S. Willway. An improved apparatus to act as a gas valve.

2535. R. Green. Improvements in raising or forcing liquids.

2537. W. and T. Riley. Certain improved means, machinery, or apparatus for "saving" or covering the lists of textile fabrics previous to the dyeing of such fabrics.

2538. J. A. Molineaux and J. Nichols. Improvements in pistons for steam engines and other cylinders.

2543. J. Stobbs and G. R. Hall. Improvements in pumps for raising water and other liquids.

2545. J. Rubery. Improvements in the manufacture of certain parts of umbrella and parasol furniture.

2546. C. Reeves. A new or improved sword.

2547. W. and G. Richardson. Partly or wholly stopping wheels of carriages of every description when in motion, and such break or breaks to be applied by the motive power.

2549. G. Davies. Improvements in the combustion of coal without smoke, which improvements are also applicable to the combustion of other kinds of fuel. A communication.

2550. M. Henry. Improvements in apparatus or machines for raking and scraping or cleaning roads, streets, ways, and places. A communication.

2557. R. H. Hughes. Improvements in hydraulic connections of gas chandeliers, lanterns, or pendants.

2560. R. A. Brooman. Improvements in apparatuses for taking photographic pictures. A communication.

2563. G. T. Robinson. A machine for obliterating postage stamps on letters, at the same time stamping the post marks, and registering the number of letters so stamped.

2566. J. Warburton. Improvements in combing wool and other fibres.

2585. G. Scott. Improvements in steam generators.

2618. M. Martin. Improved apparatus for retarding and stopping railway carriages.

2664. L. de Cristoforis. An improvement on the system of vehicle wheels, to be called the De Cristoforis conical wheels.

2684. C. Tooth and W. W. Wynne. An improved refrigerator or apparatus for cooling or attempering liquids.

2688. A. V. Newton. Improvements in the construction of sewing machines, and in the mode of operating such machinery. A communication.

2693. A. H. C. Chiandi. Improvements in the manufacture and combustion of certain products of peat, and in the apparatus employed therein.

2874. J. F. Spencer. Certain improvements in steam engines, and in the apparatus connected therewith.

2885. R. A. Brooman. Improvements in gas-burners. A communication.

3147. T. Landi and C. Falconiere. Improvements for laying subaqueous electrical cables for telegraphic communications.

3162. H. C. F. Wilson and T. Green. A machine or apparatus for making rivets.

3163. H. C. F. Wilson and T. Green. Improved machinery or apparatus for making rivets.

3194. C. Buhring. Improvements in the combination of carbonized and carbonizable with other materials, and the manufacture of such compounds into various useful articles.

36. H. Atkins. Producing scarfs, neck-ties, and other articles from the warp machine.

52. G. W. Muir. Improvements in warming and ventilating.

68. J. Macintosh. Improvements in apparatus for the manufacture of articles of confectionery.

102. J. J. Russell. Improvements in apparatus used in the manufacture of welded tubes.

128. J. Johnston. Improvements in bonnets, caps, and other coverings for the head.

131. E. Slack. Improvements in the treatment or preservation of potatoes and other amylaceous vegetable substances.

142. L. F. Corbelli. A new or improved process for obtaining aluminium. Partly a communication.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

254. Edmund Clegg.
263. Godfrey Pattison.
265. John Henry Johnson.
286. William Warbrick and John Walker.
301. George Fergusson Wilson and George Payne.
302. Frederick Ransome.
316. George Hallen Cottam and Henry Richard Cottam.
320. Auguste Edouard Loradoux Bellford.
331. Auguste Vallery.

LIST OF SEALED PATENTS.

Sealed February 5th, 1858.

2123. Daniel Jones Crossley.
2124. Ellis Rowland.
2127. John Parker.
2132. Thomas George Shaw.
2140. John Roberts, jun.
2157. Robert McAdam.
2180. John Abraham.
2225. François Jules Blanc.
2287. Lionel Gisborne and Henry Charles Forde.
2481. John Chubb.
2554. Athanase Victor Constant Regnauld.
2728. Johan Ernst Fridrich Luedeke.
2867. Alfred Vincent Newton.
2896. Philip Bettle.
2911. John Cope.
2984. Richard Hipkiss & William Olsen.
2987. Edward Clarence Shepard.
2996. Alexander and Henry Parkes.
3103. James Broad.

Sealed February 9th, 1858.

2139. James Bertram & John Louis Jullion.
2143. Amherst Hawker Renton.
2144. Peter Augustin Godefroy.
2145. George Chambers.
2150. Thomas Hardcastle.
2151. Robert Wagstaff.
2152. Robert Wagstaff.
2153. William James Cantelo.
2170. Samuel Clift.
2177. John Buckley & Thomas Wrigley.
2197. Arthur Wall.
2198. Arthur Wall.
2205. William Hartley.
2263. James Goodwin & Andrew Boyd.
2271. Robert Aytoun.
2278. George Cumming.
2291. George Bell.
2325. William Edward Newton.
2333. Willam Sellers.
2395. Thomas Sidebottom Adshead and John Platt.
2413. Hugh Greaves.
2443. Pierre François Joly.
2485. Richard Watson.
2519. James Ward.
2727. William Clark.
2761. John Lawson.
2876. Thomas Richardson.
2893. Adolphe Ambroise Salomon-Cohen.
2941. Augustus Frederick Butler.
2966. Robert Tindall, jun.
3073. Joseph Parker.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICES TO CORRESPONDENTS.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

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Mechanics' Magazine.

No. 1802.] SATURDAY, FEBRUARY 20, 1858. [PRICE 3D.

Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London.

A NEW HYDRAULIC ENGINE.

Fig. 1. Fig. 3.

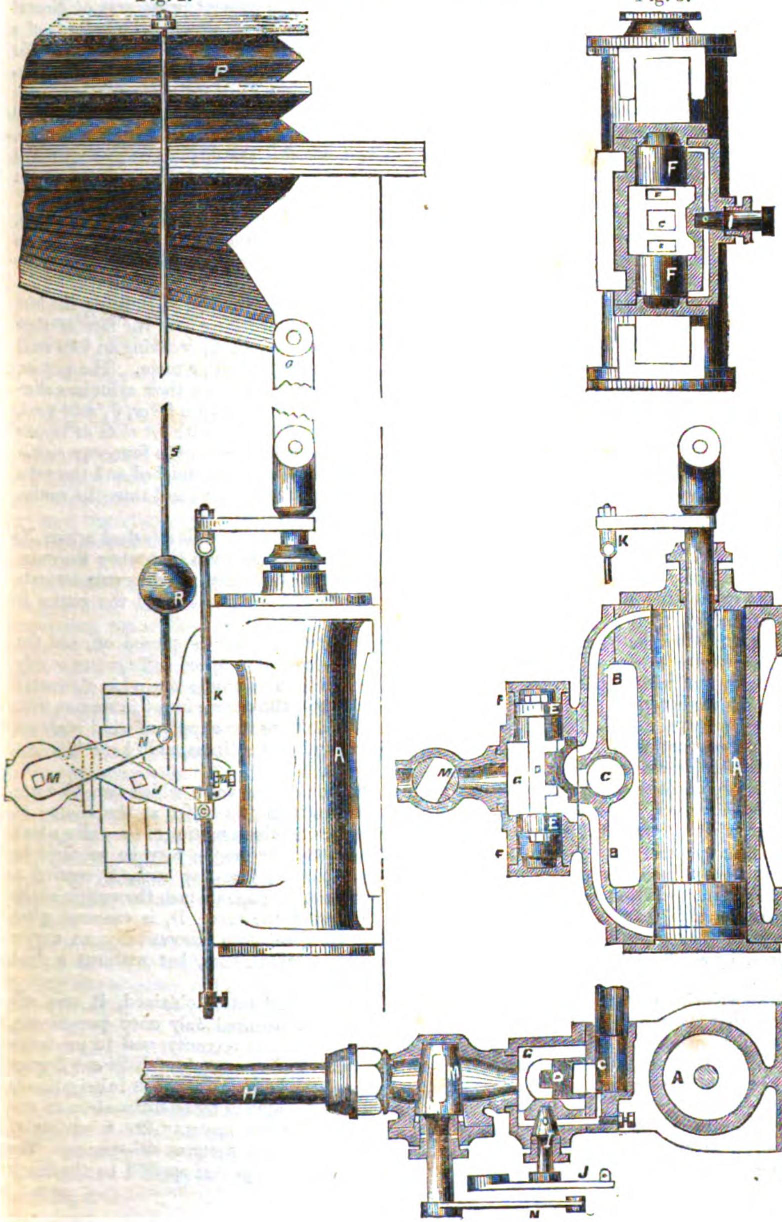

Fig. 2.

Fig. 4.

ON A NEW HYDRAULIC ENGINE:

A PAPER READ BY MR. DAVID JOY, OF LEEDS, AT THE INSTITUTION OF MECHANICAL ENGINEERS.

The form of hydraulic engine which is the subject of the present paper was originated by the requirement of a motive power for the special purpose of blowing the bellows of a large organ, and was not at the time intended to be applied beyond the single case for which it was designed by the writer. Several conditions were requisite in the arrangements: first, that the power should be supplied from some constantly accessible source; this condition at once pointed to water pressure as the only available power, and resolved the question into a hydraulic engine, required, not only to give out a reciprocating motion, but to be capable of regulation down to the slowest possible speed without having a dead point; at the same time, to be perfectly free from the shocks due to water in motion at high pressure.

The accompanying engravings show the arrangement adopted to meet these conditions. Fig. 1, is a side elevation of the engine, showing the attachment to bellows; Fig. 2, a vertical section through the cylinder; Fig. 3, a vertical section through the valve chest; Fig. 4, a sectional plan.

A, is the cylinder, with ports the same as in a steam-engine cylinder, B, B, being the inlet ports, and C, the exhaust. D, is a common slide valve, working over the face of these ports, and moved by its attachment to a small double piston, E, E, working in two small cylinders, F, F, in the ends of the valve box, G. H, is the water main. The pistons, E, E, are moved by the water pressure, which is let into and out of their cylinders alternately by a small four-way cock, I; this four-way cock is moved by a lever, J, and a rod, K, which is attached to an arm on the piston rod; the rod is fitted with set nuts or tappets for adjusting the action of the four-way cock. In the outlet port of the four-way cock is a set screw, L, by which the area of passage of that port can be diminished and the water retarded to any desired extent in its escape from the cylinders, F, F, and thus the motion of the valve, D, regulated. O, is the attachment to the feeder.

On the water main, H, is a large ordinary stop cock, M, to which is attached a lever, N, and rod, S, connected to the reservoir of wind, P, at such a position that when the reservoir is full, the cock, M, is closed and the engine at rest; but when the reservoir descends by the exhausting of the air, the cock, M, is opened by the weight, R, and the engine is set in motion.

Fig. 1, shows the normal position of the engine when the water is turned on, and the reservoir full; the engine then moves only at an extremely slow speed sufficient to supply the leakage of wind through the material of the reservoir. The moment wind is abstracted from the reservoir, its depression opens the cock, M, and the engine is set in motion with a speed proportioned to the amount of the exhaustion. Thus the supply of wind is always in exact proportion to the demand, and overblowing and unsteadiness, as in hand blowing, are entirely prevented.

The peculiarities of the engine are,—having a motion of the valve which can be regulated as to speed, so as perfectly to prevent any shocks from the water at the change of stroke, whatever may be the pressure of the water used; and also a motion of the valve which can leave no possibility of a dead point, however slowly the engine may be required to work. By reference to the drawings it will be seen that the four-way cock, I, receives a complete motion from the piston rod *prior* to the valve, D, (upon which the action of the engine depends) having any motion; hence the motion of the valve, D, is ensured *after* the piston has completed its stroke. We have, therefore, even theoretically an engine moved by a non-elastic fluid, without the assistance of momentum, but without a dead point.

The principles of the engine being settled, and a perfect action obtained, it was still found that the need for greasing the slide valve, though required only once per month, was a detriment; and the next object was to remove even this necessity, and to produce a machine which would require absolutely no attention. Various metals of different degrees of hardness were tried in conjunction; also various methods of ensuring the lubrication or moistening of the rubbing surfaces; but the metals were always found ultimately to rub dry and bite or cut into one another. All this pointed to the necessity for a variety of material in the rubbing surfaces—say metal upon some totally different substance. The paper read before the Institution last year on "Wood Bearings" as applied to the screw

shafts of steamers at once suggested wood as the required material; and, after two attempts at proportioning the valve, a completely satisfactory result was obtained. Glass was also tried at the suggestion of one of the members of the Institution, but was found to wear much more rapidly than wood. Specimens of the various kinds of valves are exhibited, and an engine sufficiently open to allow of examination of its parts. There is also one at work applied to the large organ at the Art Treasures Exhibition.

The above are only the results of numerous and varied experiments: and it would be impossible here to detail the trains of idea and experiment which led to these results, or individually to acknowledge the assistance rendered by those who have examined the engine or assisted in its construction.

The Chairman (J. E. M'Connell, Esq.) observed that the apparatus seemed an ingenious and useful arrangement for getting over the difficulty of passing the dead points smoothly and with certainty in using water pressure, and he thought it likely to prove applicable with advantage to many purposes.

LONDON FIRES IN 1857.

Twenty-seventh Annual Report. By Mr. William Baddeley, C.E., Inventor of the Portable Canvas Cisterns, Improved Jet-spreaders, the Farmer's Fire-engine, &c., &c.

"The statistics of London Fires are by no means devoid of interest, and the time may come when they will form an index to the social advancement of the people; for, in proportion as houses are built more and more fire-proof, and habits of carefulness become more and more diffused, the number of destructive fires will assuredly lessen."—*Knight's London.*

All the varied and eventful occurrences of 1857 have now become matter of history, and I once more present your readers with my usual statistical record of metropolitan fires for the past twelve months. The total number of fires in London and its suburbs in 1857 was 1,115—an increase of 158 upon the preceding year, and also a large increase upon the average of the 24 previous years. The number of *totally destroyed* (32) shows a slight decrease, while the number of *seriously damaged* (439) shows an increase of 80, and of these 64 were "all but destroyed." The number of *slightly damaged* (644) is also exactly 80 in excess of the previous year. Of these fires 250 were extinguished by the inmates of the premises, without assistance; 420 were extinguished by the inmates, with casual aid; and the extinction of 445 devolved upon the firemen. Parish engine-keepers have rendered efficient service at upwards of 100 fires.

The suburbs have had a fair share of last year's fires. The neighbourhoods of Shoreditch, Bethnal-green, and Hoxton, although not engrossing so large a proportion of the whole number of metropolitan fires as in the preceding year, have still been the locale of a large number—many of them serious fires. The Shoreditch parish-engine, including attendance at houses and chimneys on fire, registered nearly 200 ruins.

The following table shows the monthly distribution of last year's fires, with their fatalities, &c:—

Months.	Number of Fires.	Number of Fatal Fires.	Number of Lives Lost.	Chimneys on Fire.	False Alarms.
January	88	1	1	10	4
February	81	2	2	6	10
March	99	3	8	13	7
April	88	0	0	4	4
May	79	0	0	8	7
June	109	1	1	7	14
July	117	2	4	6	10
August	106	0	0	8	6
September	80	0	0	6	10
October	80	1	1	12	8
November	97	0	0	5	6
December	91	4	7	6	10
Total	1115	14	24	91	96

The instances in which insurances were known to have been effected upon—

The building and contents	318
The building only	106
The contents only	344
Uninsured	347
	1115
Chimneys on fire	91
False alarms	96
Making the total number of calls	1302

The Royal Society for the Protection of Life from Fire continues to progress most satisfactorily in the development of its benevolent mission, and has become one of the

most popular Institutions of the day; nor need this be wondered at, while more than 500 families have had living and loving testimonials of the Society's usefulness, where, but for their exertions, a melancholy blank and remembrances of the lost ones is all that would have remained.

During the past year *five hundred and fourteen* fires have been attended, and the total number of persons rescued from burning buildings by the conductors and escapes of the Society has been *seventy-three*, as exemplified by the following statement:—

Date.		Place.	Conductor's Name.	Lives Saved.
January	15	No. 92, East-street, Manchester-square	Hutchings.	2
"	25	1A, Minories	McComb.	7
February	17	41, Kingsland-road	Barton.	4
"	19	15, New-street, Covent-garden	Gould.	3
March	2	41, High-street, Aldgate	Harmsworth.	5
"	8	41, Islington-green	Newell.	4
"	14	6, Snow-hill	Arkell.	4
April	2	7, Leadenhall-street	Harmsworth.	1
"	28	150, Blackfriars-road	Vermor.	1
"	30	19, Eldon-street, Finsbury	Bresnehan.	3
May	19	10, Middle-row, Holborn	Arkell.	3
June	18	59, Exmouth-street, Clerkenwell	Sunshine.	2
July	9	3, Earl-street, Blackfriars	Welford.	2
"	9	14, Fore-street, Cripplegate	Bresnehan.	4
"	20	98, Old Gravel-lane, Shadwell	Douglas.	2
"	27	14, High Holborn	Arkell.	2
August	25	61, Whitechapel-road	Wood.	5
October	19	40, Leather-lane, Holborn	Arkell.	5
"	27	3, King-street, Long-acre	Paine.	2
November	16	7, Sun-street, Bishopsgate-street	Warren.	3
"	19	122, Cheapside	Low.	1
"	21	2, Spectacle-alley, Whitechapel	Wood.	7
December	10	25, New-road, St. George's East	Douglas.	1
				73

In the year just ended the *Royal Society* have stationed fire-escapes at Ball's-pond, Barnsbury, Upper Holloway, Southwark-bridge-road, Walworth-road, Old Kent-road, Camberwell-green; High-street, Peckham, Piccadilly, and Golden-square. The two latter stations are in lieu of those formerly under the local management of the St. James's Society. The *Royal Society* has supplied these stations with new and improved fire-escapes, and moved the station, which was maintained (whilst the St. James's could not be depended upon) in Coventry-street, to the corner of Bow-street, Long-acre, thus gaining the full benefit of another valuable position, and one that cannot fail to prove highly beneficial to the surrounding populous neighbourhood.* Thus it will be seen how gradually but effectually every locality in the metropolis is being provided with fire-escape stations, forming a continuous chain at half-mile distances from each other, attended throughout the night by active, zealous, and well-appointed conductors, whose duty it is to attend to every fire of which they have notice in their districts.

The Fire-escape Brigade now comprises a body of 60 well-trained men, whose attendance at fires is in every way highly beneficial. In the first place, their presence inspires confidence, and often enables persons to avail themselves of ordinary means of escape which the paralyzing effect of fear had closed to them: in cases of imminent peril they ensure a safe and easy rescue. If the inmates are not in danger, the prompt arrival of a fire-escape conductor often enables him, by the skilful application of a few buckets of water, to stop many incipient conflagrations. Or, when the fire has progressed far beyond their reach, they assist the well-appointed Fire Brigade by carrying the hose to the top of the fire-escapes, from which advantageous position many a fire has been successfully combated. In this connexion the *Royal Society* are happy to testify to the perfect harmony and desire to assist each other which subsists between the London fire establishment and the fire-escape conductors, as also to the active support and co-operation they at all times receive from the police, both City and metropolitan.

The direct usefulness of the *Royal Society* since its re-establishment, 14 years ago, is evidenced by the fact of *six* fire-escape stations being increased to *fifty-six*; 3,563 fires having been attended, and

* Two lives have already been saved by its instrumentality—vide Oct. 27 in preceding table.

440 persons rescued from burning buildings. The Society's silver medallions, testimonials, and pecuniary rewards have been given in 319 deserving cases.

The number of *fatal fires* and of lives lost is slightly in excess of the preceding year. These cases may be classed under the following heads:—

	Fires.	Lives Lost.
Personal accidents from the ignition of wearing apparel	6	6
" " " from recklessness	1	2
Inability to escape from burning buildings	7	16
	14	24

Of the fatal fires the following require a passing notice:—

Saturday, March 14.—Soon after eight o'clock in the evening a fire broke out in the first-floor back room of No. 5, Gower's-place, Mill-yard, Whitechapel. The house was occupied by several poor families, and at this time a number of persons were in the house, most of whom effected their escape; but a man named Hayes, and a son of a lodger named Bressnau, four years of age, who were in the second floor, were overpowered by the smoke and heat, and both perished. The locality is a very retired one, seldom visited by a policeman, and great delay occurred in sending for assistance. Had timely notice been given at the Whitechapel fire-escape station, this loss of life would most probably have been prevented.

Monday, March 16, 11¾ p.m.—A fire broke out at No. 10, Mansell-street, Goodman's-fields, in the occupation of Mr. Ryan, straw bonnet-maker; it began in the back parlour, and made great progress before it was discovered. As soon as perceived by the inmates an alarm was given. Mr. Ryan, his wife, two daughters, and two sons escaped by the top of the house, assisted by two lodgers (brothers), named Severn. Two females were rescued from the first and second floors with the same assistance, and ultimately all escaped in safety except the servant, Mary Ann Wilmot, aged 20, who, although sleeping with Miss Ryan, and roused by her, remained behind in her room, and was burnt to death. The deceased was rather deaf, and somewhat dull of intellect, and it is a remarkable circumstance that she narrowly escaped from a fire in Leman-street, in June, 1856, as narrated at page 173 of your 66th Volume.

Tuesday, March 17, 9½ p.m.—A fire broke out in the shop of Mr. Rayner, milliner, &c., No. 8, St. Mary's-terrace, Camberwell-gate, owing to the gas igniting some goods in the window. On the alarm being given, by a lad who was shutting up the shop, the servant-girl caught up an infant that was in the back parlour, and rushed into the street. Mrs. Rayner ran up stairs to her four children, who were at the time in bed; in attempting to return she was overpowered by the smoke, and, losing her presence of mind, all five perished. Several persons heroically ascended to the first-floor landing, but, fearful of having their retreat cut off, ventured no farther. Had they proceeded upward, however, a safe escape was open by the attic windows. A man with a horse and cart galloped to the Elephant and Castle for the fire-escape stationed there in eight minutes; in twelve minutes more the fire-escape was placed against the burning building, but, alas, great as was the exertion made, it was too late—the flames were pouring from every window, and an entrance was impossible. The distance thus rapidly travelled was rather more than a mile. By an arrangement with the parish authorities of Newington, a fire-escape has since been stationed in this locality by the *Royal Society*.

Tuesday, June 2, 6½ p.m.—A fire suddenly broke out in the private dwelling of Mr. Geale, No. 18, Mansfield-place, Kentish-town. At the time of the outbreak most of the inmates were from home, and it was not known that a little boy, aged four years, was in one of the rooms; consequently no attempt was made to save him, and he perished in the conflagration.

Saturday, July 18, 7½ p.m.—A fire broke out in the front kitchen of Mrs. James, stationer, &c., No. 7A, Charles-street, Hatton-garden. At the cry of "Fire!" Mrs. Smith, who occupied the second floor, opened her room-door, but found the smoke pouring up the staircase in such volumes as to preclude the possibility of escape in that direction; she, therefore, with her five children, got out on to some leads, and thence into the next house. A young woman was rescued from the second-floor front window by a man named Martin, with a builders' ladder: thus all the inmates were saved. But several persons, strangers, went and fetched the *Royal Society's* fire-escape from St. Andrew's-court, and placed it against the next house. A man named Tookey ascended the escape and entered the house, most imprudently bringing out a young girl named Kybirk, with whom he was descending the ladder. On reaching the wicket, which another man had left open, Tookey missed his footing and fell, with the child, to the ground, both of them receiving fatal injuries. At the Coroner's inquest, the jury returned a verdict of "Accidental death," and "strongly recom-

mended that the fire-escapes should be kept locked up until their conductors came on duty at night, unless the conductors lived so near the station as to be able to work them, if required, in the day-time." The origin of this fire was never satisfactorily ascertained; but one which occurred in the same premises a fortnight previously was attributed to a defective flue in the adjoining house.

Monday, July 27, 2¼ a.m.—A fire broke out in the back part, ground floor of the premises occupied by Mr. Geo. Maidment, saddler, &c., No. 14, High Holborn. At the time of the outbreak no less than ten persons were in the house. Mr. Maidment, his wife, and mother escaped down stairs into a back-yard; an apprentice, named Rolfe, who slept on the second floor, after being severely burned about the lower part of his person, dropped from a window at the back of the house, and by some unaccountable means got on to the tiled roof of some back premises, from which he was rescued by fire-escape conductor Dunk. Mr. and Mrs. Grey, who were sleeping in the second-floor front room, as well as Mrs. Massey from the third floor, escaped down stairs out of the private door. On the arrival of Conductor Arkell, with the *Royal Society's* fire-escape, from Hatton-garden, he found Mr. Massey and Mrs. Chappel, whose escape had been cut off by the spread of the fire, and brought them down his machine in safety. An attempt was made to reach the sleeping apartment of Mr. Chappel at the back, immediately over the spot where the fire began, but it was impossible to do so, the apartment, with its remaining occupant, an infirm old man, being enveloped in flames. The apprentice subsequently died in the Free Hospital from the injuries he had received.

A most searching inquiry into the origin of this fatal fire was held before Mr. Wakley, the coroner, and a most intelligent jury. A strong presumption existed that this fire was wilfully occasioned, but no evidence to that effect could be obtained; the statements of the several parties most likely to be well informed upon this subject were of a most contradictory character, and in many cases directly at variance with facts,—so much so, indeed, as to involve the whole affair in impenetrable mystery. After six adjournments, on the 10th of September, the jury ultimately returned a verdict,—"That the deaths of the two deceased persons were occasioned by a fire in the premises of Mr. G. Maidment; but whether the said fire was accidental, or caused by the criminal act of some person or persons unknown, there is no evidence to show." They also expressed an opinion that Dunk, the fire-escape conductor, behaved in a very meritorious manner on the occasion.*

Saturday, December 19th, three a.m., a fire broke out in the shop of Mr. Harman, fringe-weaver, No. 27, Anchor-street, Bethnal-green, by which a family of three persons were destroyed. From the evidence which was adduced at the inquest, it appeared that Mr. Harman had been drinking nearly all the previous afternoon, and had been in and out of his premises two or three times,—the last time between one and two o'clock in the morning. At the hour stated, a police-constable, who was in company with Mr. Harman in the street, discovered that his premises were on fire; Mr. Harman immediately rushed to the street-door and forced it open, thereby increasing the fury of the flames. After the lapse of some time, Mr. Metcalf, his wife, and a daughter, aged seven years, were aroused, and the two latter appeared at the second-floor window, upbraiding Harman as the author of the fire. He told them to go upstairs, and went himself through the next house on to the roof to endeavour to assist them. It would seem, however, as if the staircase was so filled with smoke as to be impassable, for they were seen no more until after the fire was extinguished, when all three were found suffocated on the floor of their apartment.

Mr. Harman was taken before the magistrate at Worship-street police-court, and charged on suspicion of having wilfully set fire to his house and caused the death of his lodgers. After hearing the evidence the case was remanded for a few days, when a re-hearing took place, at the close of which Mr. Hammill, the presiding magistrate, said, "that, although he considered that the entire conduct of the prisoner, who had been clearly proved to be intoxicated on the occasion, was replete with suspicion, there was, undoubtedly, not sufficient tangible evidence to submit to a jury;" he, therefore, ordered him to be discharged. The coroner's inquest, after three protracted sittings, returned a verdict, "That John, Ann, and Julia Maria Metcalf were suffocated by the noxious vapour and smoke arising from a fire which broke out on the premises of Mr. Harman, No. 27, Anchor-street, Bethnal-green; but how, or by what means, the said fire was caused, they have no satisfactory evidence to show." The jury also expressed their entire approbation of the conduct of Barton, the fire-escape

* This opinion was expressed as an answer to the evidence of some of the witnesses, which, if true, impugned the testimony and threw doubts upon the conduct of the escape-man.

conductor, upon whom some unjust aspersions had been attempted to be cast.

Barton was in attendance at the fire with extraordinary promptitude, but the fire had made such rapid progress as to preclude the possibility of rendering any service—death stepped in before him.

Saturday, December 19th, half-past seven, p.m., a fire broke out in the shop of Mr. Torode, at which time two young children were sleeping on a sofa in the back parlour; great attempts were made to rescue them, but until the body of flames in the shop had been subdued, it was impossible to enter. They were eventually got out alive, but died shortly after from the severe injuries they had sustained.

Habits of intoxication—the ignition of the wearing apparel of elderly people left unattended before fire-places—the employment of children of tender age to light fires, with their propensity to play with that dangerous element,—have each furnished their victims and greatly swelled the total of deaths by fire during the year.

The daily distribution of last year's fires was as follows:—

Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.	Sunday.
141	165	166	190	156	150	147

In this, as in all other matters of number, a sort of average obtains in the long run, but the diversity in detail may be illustrated by the fact that, while the average number of fires is three per day, there were—

	21	days upon which	no	fires occurred;	
while on	49	,,	1	,,	,,
	76	,,	2	,,	,,
	87	,,	3	,,	,,
	63	,,	4	,,	,,
	36	,,	5	,,	,,
	19	,,	6	,,	,,
	9	,,	7	,,	,,
	2	,,	8	,,	,,
	2	,,	9	,,	,,
	1	,,	10	,,	,,

Their hourly distribution was as follows:—

	First Hour.	Second Hour.	Third Hour.	Fourth Hour.	Fifth Hour.	Sixth Hour.	Seventh Hour.	Eighth Hour.	Ninth Hour.	Tenth Hour.	Eleventh Hour.	Twelfth Hour.
A.M.	72	79	71	49	28	18	17	16	14	19	21	24
P.M.	22	28	20	28	29	38	63	94	106	84	109	66

In forty-six instances two fires broke out at the same time in different parts of the metropolis, while upon one occasion three fires commenced simultaneously.

The *causes* of fire, so far as could be ascertained, were as follows:—

Accidents, unforeseen, and for the most part unavoidable	5
Apparel ignited on the person	6
Areas, lights thrown down	21
Bleaching canes	2
Candles, various accidents with	109
,, ignited bed-curtains	74
,, ,, window-curtains	51
Carelessness, palpable instances of	11
Charcoal, hot	2
Children playing with fire	4
,, ,, ,, candles	2
,, ,, ,, lucifers	9
Cinders put away unextinguished	11
Coke, hot	1
Cork, burning...	2
Coppers improperly set	7
Ether, explosion of	1
Fire sparks	42
Fires kindled in hearths and other improper places...	7
Fireworks, making	1
,, selling	1
Fireworks, letting off	1
Flues, blocked up	9
,, defective	26
,, overheated	13
,, foul, and ignited	27
Friction of machinery	3
Fumigation, incautious	3
Furnaces, overheated, &c....	33
Gas, escape of, from defective fittings ...	73
,, ,, ,, street-mains	1
,, left burning too high, or in contact with combustible materials	38
,, accidents in lighting	12
,, fittings, repairing of	2
Hearths, defective	2
Hot plate	1
Hot water pipes	2
Intoxication	9
Lamps, oil	6
,, naphtha	4
,, spirit	1
Lightning	1
Lime, slaking	10

Linen, drying or airing before the fire (upset by cats, 2)	45
Locomotives, sparks from	2
Lucifer matches, accidentally ignited (by cats, 9)	25
,, ,, ignited by sun's heat	2
,, ,, making	2
,, ,, using	16
Oven, overheat of	1
Pitch and tar, heating of	5
Plumber's fire on roof	1
Shavings, loose and ignited	43
Spontaneous ignition of bone-dust	1
,, ,, coals	1
,, ,, cotton-waste	1
,, ,, greasy rubish	1
,, ,, guano	2
,, ,, hay	2
,, ,, hemp	2
,, ,, lamp black	4
,, ,, oil and sawdust ...	5
,, ,, phosphorus	1
,, ,, rags greasy	1
,, ,, ,, wet	2
,, ,, shavings wet	1
Steam boilers, heat from	7
Smoking hams	1
Spirits, drawing off	1
Sun's heat concentrated by globular oil bottle	1
Stoves improperly set, defective, or overheated	20
,, drying	10
,, gas	2
,, ironing	10
,, pipe	12
,, portable	4
Suspicious	27
Tallow, melting	3
Tobacco, unextinguished	46
,, pipes and cigars, lighting of	3
Turpentine, drawing off	1
,, heating of	1
Varnish making	2
Wax tapers	3
Wilful	51
	1017
Unknown	98
Total	1115

It will be seen that some of the usual causes of fire present a striking increase; *candles* have occasioned 234 fires; *gas*, 126. Spontaneous ignition has been detected in 24 cases. The number of wilful fires is also considerably in excess of former returns; in several of these cases the offenders were brought to justice—but justice declined to have anything to do with them.

At the sittings of the Central Criminal Court, in July last, Joseph Foxman was indicted for setting fire to a dwelling house; and with intent to defraud the Sun Fire-office, in which he had effected an insurance for 100*l*. on the 15th of May. On the 18th the fire took place. Shortly before the fire broke out the wife of the prisoner purchased half a pint of naphtha in the neighbourhood, and the prisoner was seen to sprinkle the contents of a bottle upon some clothes hanging upon a line, and on the floor of the kitchen. He then came out and locked the door, and immediately afterwards the fire broke out. The intention of the prisoner had been communicated to the police, who, with the firemen, were on the alert, and the fire was soon extinguished. Evidence was given of the trifling value of the prisoner's furniture, and that the more valuable articles had been removed. At the close of the case for the prosecution, the Learned Judge said, it appeared to him to be doubtful whether the evidence made out a setting fire to a *dwelling-house* within the terms of the statute; the fire appeared to have done injury *only to the dresser*, and the evidence left it doubtful whether this was so affixed to the wall as to make it a part of the freehold! After some deliberation, the jury acquitted the prisoner.

At the next sessions, in August, Asher Stern, a foreign Jew, was indicted for feloniously setting fire to a dwelling-house; and with intent to defraud the West of England Insurance Company. The prisoner was a manufacturer of water-proof coats, in Little Alie-street, Whitechapel, and on the evening of March 15th, a fire broke out in a second-floor back room, but was extinguished before any serious damage had been done. In less than an hour afterwards another fire occurred in the same apartment, and very serious damage resulted. Three persons in the prisoner's employ had accused him of wilfully setting fire to his house, and threatened to give information to the insurance office if he did not give them some money; they were subsequently indicted for the offence of endeavouring to extort money from him by a threat of charging him with setting fire to his house, found guilty, and sentenced to four years' penal servitude. The result of further inquiries led to the apprehension of the prisoner, the parish authorities feeling it to be their duty to prosecute. On the present occasion a witness swore to seeing the prisoner deliberately set fire to the contents of the room with a candle. The agent to the West of England Fire-office proved that the prisoner had effected an insurance in that office; after the fire he sent in a claim for 480*l*.—on being investigated, the office paid him 160*l*. The prisoner's counsel argued that, if the Insurance Company thought there was anything wrong, it was not very likely that they would have paid the money! After half an hour's deliberation, the jury returned a verdict of "not guilty." The prisoner has, however, subsequently obtained unenviable notoriety, from the extraordinary disclosures made in the Insolvent Debtors' and Bankruptcy Courts, with reference to his commercial transactions.

The frequency with which fires precede a declaration of insolvency, or of bankruptcy, is matter of daily observation.

(*To be continued.*)

ON MOLECULAR IMPRESSIONS BY LIGHT AND ELECTRICITY.

A LECTURE on the above subject was delivered by W. R. Grove, Esq., Q.C., V.P.R.S., at the Royal Institution, Albemarle-street, on the evening of Friday, Jan. 29. The following is the substance of the learned gentleman's able address, which will be found to contain much interesting and novel information:—

The term *molecule* is used in different senses by different authors: by some it is employed with the same meaning as the word *atom*, *i.e.*, to signify an ultimate indivisible particle of matter; by others to signify a definite congeries of atoms forming an integral element of matter, somewhat as a brick may be said to be a congeries of particles of sand, but a structural element of a house.

The term is used this evening to signify the particles of bodies smaller than those having a sensible magnitude, or only as a term of contradistinction from masses. If there be any distinctive characteristic of the science of the present century as contrasted with that of former times, it is the progress made in molecular physics, or the successive discoveries which have shown that when ordinary ponderable matter is subjected to the action of what were formerly called the imponderables, the matter is molecularly changed. The remarkable relations existing between the physical structure of matter, and its effect upon heat, light, electricity, magnetism, &c., seems, until the present century, to have attracted little attention: thus, to take the two agents selected for this evening's discourse, Light and Electricity, how manifestly their effects depend upon the molecular structure of the bodies subjected to their influence? Carbon in the form of diamond transmits light but stops electricity. Carbon in the form of coke or graphite, into which the diamond may be transformed by heat, transmits electricity but stops light. All solid bodies which transmit light freely, or are transparent, are non-conductors of electricity, or may be said to be opaque to it; all the best conductors of electricity, as black carbon and the metals, are opaque or non-conductors of light.* Bodies which have a peculiar but definite and symmetrical structure, such as crystals, affect light definitely and in strict relation to their structure: witness the effects of polarized light on crystals; and there are not wanting instances of similar relations between the structure of bodies and their transmission of electricity.

The converse of this class of effects, however, forms more properly the subject of this evening's communication, viz., the changes in the molecular structure of matter produced by Light and Electricity. The effect of Light on plants, on their growth and colour, the bleaching effects of light on coloured bodies, the phosphorescence of certain substances by insolation or exposure to the sun, have long been known, and yet do not seem to have awakened in the minds of the ancient natural philosophers any notion of the general molecular effects of light. Leonard Euler alone conceived that light may be regarded as a movement or undulation of ordinary matter; and Dr. Young, in answer, stated as a most formidable objection, that if this view were correct all bodies should possess the properties of solar phosphorus, or should be thrown into a state of molecular vibration by the impact of light, just as a resonant body is thrown into vibration by the impact of sound, and thus give back to the sentient organ an effect similar to that of the original impulse.

In the last edition of his Essay on the "Correlation of Physical Forces" (1855, p. 131), Mr. Grove has made the following remarks on this question: "To the main objection of Dr. Young that all bodies would have the properties of solar phosphorus if light consisted in the undulations of ordinary matter, it may be answered that so many bodies have this property, and with so great variety in its duration, that *non constat* all may not have it, though for a time so short that the eye cannot detect its duration; the fact of the phosphorescence by insolation of a large number of bodies is in itself evidence of the matter of which they are composed being thrown into a state of undulation, or at all events molecularly affected by the impact of light, and is therefore an argument in support of the view to which objection is taken." The above conjecture has been substantially verified by the recent experiments of M. Niepce de St. Victor, of which the following is a short *resumé*:—

An engraving which has been for some time in the dark is exposed to sunlight as to one half, the other half being covered by an opaque screen: it is then taken into a dark room, the screen removed, and the whole surface placed in close proximity to a sheet of highly sensitive photographic paper. The portion upon which the light has impinged is reproduced on the photographic paper, while no effect is produced

* It should be borne in mind that these terms are not absolute, but only express a high degree of approximation.

by the portion which had been screened from light.

White bodies produce the greatest effect, black little or none, and colours intermediate effects.

An engraving exposed as before, then placed in the dark upon white paper, conveys the impression to the latter, which will in its turn impress photographic paper.

Paper, in a tin case, exposed to sunlight, then covered up by a tin cover will, when opened in the dark, radiate from the aperture phosphorescent force, and produce a circular mark on the photographic paper, and even impress on the latter the lines of an engraving interposed between it and the photographic surface.

Phosphorescent bodies produce similar effects in a greater degree, and bodies which intercept the phosphorescent effect intercept the invisible radiations. A design drawn by a fluorescent substance, such as a solution of sulphate of quinine on paper, is reproduced, the design being more strongly impressed than the residual parts of the paper.

Mr. Grove had little doubt that had the discourse been given in the summer instead of mid-winter, he could have literally realized in this theatre the Lagado problem of extracting sunbeams from cucumbers!

While fishing in the autumn, in the grounds of M. Seguin, at Fontenay, Mr. Grove observed some white patches on the skin of a trout, which he was satisfied had not been there when the fish was taken out of the water. The fish having been rolling about in some leaves at the foot of a tree, gave him the notion that the effect might be photographic, arising from the sunlight having darkened the uncovered, but not the covered portions of the skin. With a fresh fish a serrated leaf was placed on each side, and the fish laid down so that the one side should be exposed, the other sheltered from light: after an hour or so the fish was examined, and a well-defined image of the leaf was apparent on the upper or exposed side but none on the under or sheltered side. There was no opportunity of further experiment; but there seems little doubt of the effect being photographic, or an oxidation or deoxidation of the tissue determined by light.

Many important considerations might be suggested as deducible from the above results, as to the influence of light on health, both that of vegetables and animals. The effect of light on the healthy growth of plants is well known; and it is generally believed that dark rooms, though well heated and ventilated, are more "close" or less healthy than those exposed to light. When we consider the invisible phosphorescence which must radiate from the walls and furniture, when we consider the effects of light on animal tissue, and the probable ozonizing or other minute chemical changes in the atmosphere effected by light, it becomes probable that it is far more immediately influential on the health of the animate world than is generally believed.

The number of substances proved to be molecularly affected by light is so rapidly increasing, that it is by no means unreasonable to suppose that all bodies are in a greater or less degree changed by its impact.

(To be continued.)

ON THE STRENGTH OF TONE OF WIRES IN PIANOFORTES.

BY GENERAL T. PERRONET THOMPSON, M.P.

The following observations on the strength of tone of wires, collected, with improvements, from a former work on the Theory of music rather than on the Mechanics, may contain something useful to the constructors of musical instruments.

With the same materials and length, and when the difference of diameters is not very great, all wires break at the same pitch; which is the necessary result of the strength of the wire, and the load required to bring it to the same pitch, both varying as the square of the diameter. If the wire of greatest diameter breaks sooner, it is because it is not treated with equal fairness at the bends; the remedy for which is to increase the diameter of the pin round which it is bent. If the wires were of very different diameters, the increased resistance of the air on the greater diameter would make the sound somewhat flatter, and consequently require an increased tension to overcome; which would be to the disadvantage of the thickest.

In wires of different diameter, but the same length and strained to the same pitch, the thickest will have the strongest tone; because the vibrating area, which is what strikes against the air, will be greater, being as the diameter.

In wires of different diameters and lengths, strained to the same pitch, the strength of tone will be as the diameter multiplied by the square of the length, or multiplied by the length twice over. For the diameter multiplied by the length expresses the vibrating area; and the extent to which the vibrations will be carried laterally, will be as the length again.

Follows, that when the same pitch is

produced at different lengths of the same wire by different loads, the longest, and consequently the heaviest-loaded, will have the strongest tone. Whence the strongest tones at all pitches, which can be obtained from any wire, are those produced by loading it to the extent of safety, and then taking the lengths which produce the pitches desired. And from the toughest materials may be had the longest wires and strongest tones. A way to judge of the toughness of steel wire without reference to its diameter, is to see how many yards of its own kind it will support. Good wire will bear the weight of 14,500 yards.

Follows from the same, that if wires of the same materials but different diameters, are loaded with equal weights, and the lengths taken which produce the same pitch, the longest and consequently the thinnest will have the strongest tone. For since the lengths will be inversely as the diameters, the vibrating areas will be the same in both; and consequently the longest, as making vibrations of greatest extent, will have the strongest tone. Whence it follows, that if the strain upon the frame is to be of a given amount and no more, the strongest tone with which the pitch in question can be produced with the given strain, is from the thinnest wire which will bear the strain, the length being at the same time increased as demanded. Which agrees with the last in showing, that all wires should be loaded to the extent of safety, if length can be afforded; or else tone is thrown away.

These conclusions bear on the construction of pianofortes to the extent of showing that so far as other considerations do not interfere, the most advantageous shape and dimensions for what may be called the *harp*, are those indicated by loading a steel wire of the best quality and of any diameter, to the extent of safety, and taking on it the lengths required to make the different sounds, in other words, the lengths on the Monochord. This points to a wire of eight feet for bass C C, and sixteen feet for C C C. Now wherever a grand pianoforte stands, there is a space of four feet for the performer; this, therefore, might be added to the length of the longest wires, by placing them one over another in a narrow case next the wall, without virtually adding to the length required for the instrument. And such wires should be double.

The advantage of multiplying wires for the same sound, is that if a given quantity of strain instead of being applied to one wire which it loads to the extent of safety, is divided among four wires of the same length and half the diameter, the pitch and the sum of the strains will be the same as before, but the vibrating areas will be doubled, and consequently the strength of tone increased in something like the same proportion. And with any other number the advantage gained will be as the square root of the number of wires; which in round terms is with two wires, as 7 to 5, and with three, as 8¾ to 5. Hence the wires of the extreme bass ought to be doubled, as increasing the strength of tone in something like the proportion of 7 to 5, with the same total strain.

What is wanted, then, for improving the tone of pianofortes, is, so far as other reasons do not intervene, to increase the length and thickness of the wires. And this will end in a contest for bearing the greatest strain; the tendency of which will be to make the frame approach to a solid shell of iron, being the form of the original lyre attributed to Mercury, which was the shell of a tortoise.

The same conclusions may be applied to strings of catgut, except that in consequence of the increasingly oblique action of the fibres in the thicker strings, the strain borne without breaking will not increase with equal regularity in relation to the diameter. But the string of catgut will bear to be strained to a higher pitch than a wire of the same diameter and length. For the loads required to bring these to the same pitch are as their specific gravities, which are as 1 to 6; while the loads they are able to bear are something like 1 to 3. Hence the wire to produce the final pitch of the catgut must be shortened to about five-sevenths (1 divided by the square root of 2), for no wire will bear straining to that pitch at a greater length; and to produce the final strength of tone of the catgut, the diameter of the wire must be doubled, with four-times the strain which was on it before, making twelve times the strain finally on the catgut. Which explains the superiority of catgut for the instruments in which it is found employed.

Many of these conclusions may be what everybody is acquainted with, but some of them may be new to some.

T. Perronet Thompson.

Eliot Vale, Blackheath, Feb. 3, 1858.

SCIENTIFIC USES OF PHOTOGRAPHY.

The introduction of photography into the corps of Royal Engineers has in a great measure arisen from the connexion of the corps with the Science and Art Department of the Committee of Council on Education,

South Kensington, a connexion first established in 1851, when the two companies of Royal Engineers were employed, under Sir W. Reid, in the Great Exhibition; two men, afterwards employed in the Department of Practical Art, received instruction in photography from Mr. Thurston Thompson, and went to the Crimea, where they had opportunity of making only a few photographs before they were unfortunately lost during the great gale in the Black Sea. During the Paris Exhibition of 1855 some of the non-commissioned officers of the Royal Engineers, who were employed there, received instruction in photography, and on their return to Southampton their knowledge thus obtained was turned to a practical use by Colonel James, R.E., F.R.S., the Director of the Ordnance Survey, in making reductions of the various maps and plans required in that work. This is the first instance of the scientific use of photography on a large scale, and some idea may be formed of its importance from the fact that the saving to the country in this item only will be not less than 30,000*l.* At a later period several non-commissioned officers of the Royal Engineers were instructed in photography, at the same department, at the request of Sir J. Burgoyne, the Inspector-General of Fortifications; and since then a systematic teaching of the Royal Engineers has been established at South Kensington, by which a constant supply of men practised in the art is maintained, who, on receiving a certificate of competency, return to the Head-quarters of the corps at Chatham, to be distributed as may be required to the various parts of the world where Royal Engineers are employed. The orders to officers commanding companies to which photographers are attached are, to send home periodical photographs of all works in progress, and to photograph and transmit to the War Department drawings of all objects either valuable in a professional point of view or interesting as illustrative of history, ethnology, natural history, antiquities, &c. Photographers with complete sets of apparatus have already been sent to Cawnpore (with Sir Colin Campbell), Bombay army in the field, Canton, Greece, Isthmus of Panama; and similar equipments are now being sent to the Cape, Bermuda, and the Rocky Mountains. These will probably be followed by others sent with every company of Royal Engineers going on foreign or colonial service, so that in a few years there will be a net-work of photographic stations spread over the world, acting under a systematic instruction, and having its results permanently recorded at the War Department. A few interesting specimens of the first fruits of such an arrangement are now on view at the exhibition of the Photographic Society at South Kensington.

SCIENTIFIC BURGLARY.

DURING the last few months several of the ordinary iron safes have been burglariously opened in London and Manchester by means of a powerful instrument employed by the thieves in cutting large holes through the iron doors, whereby they have gained access to the works of the lock. The construction and operation of the instrument were unknown until a few weeks since, when, happily, one of them with all its loose appliances was secured by the police. It would be obviously wrong to publish a description of the apparatus, but, having inspected it minutely, and seen it in operation, we are enabled to state that great ingenuity and mechanical skill have been bestowed upon its contrivance. Of course the discovery has rendered a counter improvement in the safe itself absolutely essential to security; and it is with much pleasure that we are in a position to announce the introduction of such an improvement. By the courtesy of the Metropolitan Police authorities Mr. Chubb, the eminent lock and safe manufacturer, of St. Paul's Churchyard, has been allowed to examine and experiment with the instrument, and he has succeeded completely in providing a simple method of baffling its operation. The improvement consists in placing throughout that portion of the door which is in front of the lock a number of hardened screwed steel plugs, sufficiently close to each to prevent either an ordinary drill or circular hollow cutter from passing through without encountering several of the plugs. These plugs of hardened steel have the effect of utterly destroying the edge of every description of cutter which can be used with the burglar's apparatus, and consequently render the safes secure from its operation. All Chubb's fire-proof safes and strong-room doors are now made with the above improvement, and old safes may readily have it applied. It has been protected by Letters Patent.

ON THE NECESSITY OF A MOON'S ATMOSPHERE.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Your correspondent, General T. Peronnet Thompson's attempt to prove the necessity of a moon's atmosphere,

will, I think, have startled most of your readers who have perused his letter. It is, no doubt, useful to discuss questions which have long ago been considered settled by philosophers, because we not only thereby increase our knowledge of the subjects, and become more intimately acquainted with their details, but not unfrequently light is thrown upon other matters incidentally connected with the discussion. But I must say that, in my humble opinion, a letter or an essay to prove the "*necessity*" for the existence of a thing should contain better reasoning and better logic than that displayed in your correspondent's letter.

We have hitherto considered that beyond the limits assigned to the atmospheres of such of the planets as are supposed to have atmospheres all was vacuity, or, at all events, that "space" was filled with ether. If your correspondent contends for the latter supposition, and is disposed to assert that the atmosphere of the moon consists of ether, although his theory might be combatted, it would hardly require an essay filling two pages of your valuable Magazine to prove that that which exists everywhere exists around the moon! Your correspondent does not inform us whether this is his contention, nor can I suppose that it is. I presume he means a material atmosphere, although, as he says, it would not be of sufficient density to support a cloud.

Your correspondent alleges in the third paragraph of his letter, that if the air were relieved from any pressure (from which, I presume, he means the superincumbent pressure of the atoms of air above), "it must extend itself to unlimited distances." He seems to have forgotten his previous assertion, which is, no doubt, the fact, that it is also "subject to the attraction denominated gravitation." There can be no doubt that the attraction of gravitation *alone* is the cause of the atmosphere surrounding the earth. If this were not so it is quite clear that the air "extending itself to unlimited distances" must pervade all space, and that, consequently, all planets would have atmospheres, and of the same rarity! The whole of his argument is founded upon the *supposition* (not the *necessity*) of an uniform fluid pervading all space, and attracted to the moon, as it would be to every other planet, by the attraction of gravitation. That this is so is evident from the tenth paragraph of his letter. But this is no new theory. It was advanced by Dr. Wollaston, and depends, amongst other things, upon the solution of the problem, whether matter be infinitely divisible.*

* See *Encyclopædia Britannica*, vol. 14, page 639. English edition.

Supposing, however, this space is filled with rarefied air, how is it that Jupiter and others of the planets have no atmospheres? As is stated in the *Encyclopædia Britannica*, if this theory were correct, "the sun's atmosphere should have the density of the earth's at the sea level at about 4½ times *its own radius* above its surface, and Jupiter at above $\frac{8}{11}$. At these distances from the respective luminaries the rays of light should suffer a deviation by refraction equal to twice our horizontal refraction, or more than a degree, *a result directly refuted by observation, which indicates no refraction whatever.*"

There are other fallacies in the reasoning of your correspondent, but it would occupy too much of your valuable space to correct them.

I am, Gentlemen,

Your obedient servant,

J. T.

STRENGTHENED CAST IRON GUNS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—It was not my intention when I brought the subject of my improved cannon under your notice to enter into a lengthy contention with any of your readers on the merits of "*priority*" of any particular plans, such as has since taken place between some of your correspondents; nor have I the slightest desire to do so now, although I humbly consider it quite in keeping with the spirit of invention to be permitted by you to repeat, in explanation, so far as I am individually concerned, that my strengthened cast iron, and "built-up ordnance," was the result of personal observation some 24 years before the late war with Russia, which called into action the inventive efforts now likely to be productive of some good, by convincing the Government of the necessity of carrying into operation those inventions best calculated to improve the naval and military influence of our country. The great objection of the Ordnance Committee of 1854 to cannon being constructed of detached pieces was that of the parts "*not vibrating together;*" and I pressed for a distinct answer on this point, when I called attention to the hooping the breech of cast iron guns with wrought iron, as shown in some of my plans then under discussion.

In 1855, as *before*, I had the opportunity of seeing the Select Committee again. One of your able correspondents, an artillery officer, who deserves much credit for his zeal, was more fortunately favoured by the

Committee sanctioning an experiment to be made, at his suggestion, to test the strength of a breech-hooped cast iron gun, and the results have been of the most satisfactory character; but I have not heard or seen a single remark about the presumed disadvantage of "*vibration*," so strongly urged as an objection to my plans.

At the time the objection was started by the President I simply called attention to the detached sight, about two ounces in weight, screwed on to a mass of metal of 56 cwt., and asked what appreciable disadvantage could there be in the parts not vibrating together, as the sight remained undisturbed by the firing of the gun? Since which I have put the question to several experienced professional gentlemen, who could not account for such an objection being raised. I merely mention this to show what trifling things will defeat, at times, highly valuable improvements; and I was glad to find by the experiments granted to the officer, who I have not the pleasure of knowing, but through the *Mechanics' Magazine*, the *strange idea* of the Committee was got rid of by practical demonstration; and I was also glad to find the Committee had rescinded their vibration objections to breech-loading guns by approving of examples brought under their notice after objection to the *principle* when Dr. Drake and myself appeared before them.

These changes of opinion are in the right direction, and if the War Department shall undertake to order a few more practical demonstrations, other objections equally invalid will be disposed of to the advantage of the public service; and at a cost, so far as improved ordnance is concerned, not worth naming, when we take into consideration the important advantages aimed at nationally.

I am, Gentlemen, yours, &c.,

JOHN POAD DRAKE.

London, Feb. 13, 1858.

THE WAVE-LINE SYSTEM.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—With reference to the paragraph in No. 1799, "Nauticus" has over-estimated my influence in stating that I might have procured the drawing from which the vessel was constructed; the short paragraph referred to really gave *me* no clue to the whereabouts of the vessel or her constructor; and I am still at a loss for information, as that contained in his letter is insufficient; and if "Nauticus" can favour me with a tracing of her load water lines, and immersed and emersed load water lines when heeling over 10°, I shall feel greatly obliged to him. He is quite at liberty to preserve her *name* secret, as it may happen that I shall tarnish it.

The term 10½ inches in 50 feet I took to be a relative term only. "Nauticus" quotes part of my letter, and then misapplies it. I said, "The helm having to be kept down of course *partly* accounts for a decrease of speed when on that tack." Yet he argues as though I had contended that this affected her speed to the full extent of 2½ knots an hour.

The argument in the last paragraph of "N.'s" letter is sadly out of place. It seems as though "Nauticus" considered a ship to be driven out of her course by what is termed leeway in a greater degree with the wind on her quarter than on any other point of sailing; but a clipper ship with a good breeze on her quarter can sail fifty miles a-head with one mile of leeway. When sailing close-hauled would have illustrated his meaning best, as then the leeway is greatest; but to build a ship to go leeward would require the old cod's head form; and, if his argument were good, even the cut-water would be a hindrance to the vessel's motion unless she has the wind right aft.

Hoping to receive further information in order to pursue this interesting subject,

I am, Gentlemen,
Your obedient servant,
T. MOY.

1, Clifford's-Inn, Feb. 15, 1858.

SHIPS' RUDDERS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN, — "Neptune" has more valuable fish to fry than flounders at present; and as "N. A." frankly admits that he is not able to "*suggest a better*" reason than "Neptune" for the "*shaking fit*" with which clipper ships' rudders are affected, it is very evident "Nauticus" is not much indebted to him for clearing the stream from obstruction. However, as "Neptune" is one of those who believe that every effect is produced by a cause, he hopes that "N. A." has not so "*damaged a promising discussion*" as to prevent "Nauticus" and other readers of the *Mechanics' Magazine* from discovering some better "*rationale*" for the shaking which the groove in the back of the rudder is stated to be the cure.

As "N. A." has so *kindly* promised not to puddle the water again, "Nauticus" probably can see sufficiently *clear* to give

his "theory" without further hesitation—although not sufficiently so to convince "N. A.," who seems to consider it *impossible*—doubtless, quite impossible.

NEPTUNE.

February 13.

APPARENT VIBRATION OF STARS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—This is said to be produced by rays of light which proceed from the same centre of vibration and destroy each other, owing to the inequality of their paths; but I object to this as insufficient, because if such were the cause why do not the planets appear to vibrate in the same manner? It may be said that their distance is insufficient, but I doubt whether this is the reason, and will state what appears to me to be the cause of the phenomena.

You may have observed that an earthly body appears at a distance to very slightly oscillate, if I may use the term, while it is really at rest, which does not appear if such an object be ever so little in motion; but a steady observation is necessary to detect this. Now, we may of course apply this principle to the heavenly bodies, and shall thus perceive the reason of the difference alluded to. I may add that as the earth moves equally with respect to both stars and planets it must produce the same apparent results upon both, so that where there is such an important difference as the one noticed it is evident that the objects themselves are not in the same circumstances.

I am, Gentlemen, yours, &c.,

J. A. D.

TO MEASURE THE BREADTH OF A TOWER OR OTHER OBJECT.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—When the distance of the base is found this operation is most simple. Take the apparent angle formed by a pair of compasses directed to the object, which lay down upon paper, and produce the sides till the base is reached, when the width will be that of the object upon the scale by which the distance has been found. Thus one position only is required.

I am, Gentlemen, yours, &c.,

J. A. D.

AN IMPROVED NAIL.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—The liability of the common nail to give way renders it comparatively useless where there is a constant and considerable strain, and a screw is sometimes, from various causes, objectionable, which being the case, I would suggest that nails should be manufactured having a series of downward incisions. These would obviously give them a firmer hold upon any substance, on account of their elasticity and consequent readiness to catch upon an attempt to draw a nail.

I am, Gentlemen, yours, &c.,

J. A. D.

January 30, 1858.

IMPROVED YARDS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Allow me to propose that yards should be made with a hinge in the middle, so as to double up when required. It appears to me that this would greatly facilitate the operation of reefing, which could be effected by merely causing each yard to fold downwards, when the sails would remain stretched, and would, I think, be sufficiently free from the action of the air.

I am, Gentlemen, yours, &c.,

J. A. D.

January 30, 1858.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

WALTON, F., and J. PINSON. *New or improved machinery for stamping or raising metals.* Dated May 22, 1857. (No. 1447.)

Claim: stamping machinery in which the convex die placed on the bed of the stamp is gradually raised during the stamping process.

HINE, B. H., and W. ONION. *Improvements in knitting machinery for the manufacture of ribbed fabrics.* Dated May 22, 1857. (No. 1448.)

This relates to ribbed fabrics having similar ribs produced on both sides thereof, the object being simplicity in the apparatus employed, also superiority in the fabric produced, with increased speed of production. Two sets of needles, each affixed to a moveable needle bar with a stationary presser, are used. The machine bar is stationary (carrying the sinker bar, hand bar, jack bar, and spring bar), the knocking over being effected by the motion of the needle bars.

FOX, S. *An improvement in the manufacture of flat steel wire, used for the manufacture of the ribs and stretchers of umbrellas and parasols.* Dated May 22, 1857. (No. 1450.)

The flat wire, after being drawn through

dies to nearly the required section, is completed by being rolled between rollers.

SCHUTTENBACH, A. DE. *Improvements in preparing fatty matters for the manufacture of candles and other purposes.* Dated May 22, 1857. (No. 1452.)

This consists in combining the vapour of paraffine with the vapour of the fatty matters used, a steam jet being employed to condense the two together.

CARRON, W. *A new or improved nail, spike, or bolt, and machinery for manufacturing the same.* Dated May 23, 1857. (No. 1453.)

This consists in making nails, spikes, &c., of a form which in transverse section resembles a triangle. The sides of the nails may be flat, convex, or concave. The machinery consists of three mitred rolls, the peripheries of which are so sunk that, when they are brought together and heated, triangular or other iron rods are rolled between them. The rolls are mounted each on an axis, and are geared together by bevelled toothed wheels.

TRAVIS, E., and J. L. CASARTELLI. *An improved apparatus for regulating the supply and discharge of steam, air, water, and other fluids.* Dated May 23, 1857. (No. 1456.)

A box is made with a slide tube at one end, a piston or valve at the other, and an escape tap at the side. This is fixed to the end of an additional pipe attached to the ordinary steam pipe. When steam begins to escape through the tap and the additional pipe becomes heated and expanded, the piston or valve is adjusted so as to stop the escape of steam; and when it cools, the contraction of the pipe will draw the sliding tube from the piston and cause it to open, thereby allowing any condensed steam or water to escape.

ROBERTS, T. H. *Machinery or apparatus for cleaning the inside of casks and puncheons.* Dated May 23, 1857. (No. 1458.)

This consists in the use of apparatus by which casks, &c., are made to revolve, charged with hot water and shot, or iron or stone balls, for the purpose of cleaning them. The patentee causes an endless band to receive rotary motion from a revolving drum, horizontally mounted upon suitable standard bearings, so as to admit of any sized cask, &c., being placed within the said belt, and to revolve on its bilge, or end over end.

SILVER, T. *An improved steam-engine governor.* Dated May 23, 1857. (No. 1459.)

This consists mainly of a fly-wheel fitted with vanes, &c., and working in connexion with certain pinions, chains, a forked lever, &c. It cannot be well described without illustrations.

BARRE, G. O. DE LA. *Improvements in obtaining and applying motive-power.* (A communication.) Dated May 23, 1857. (No. 1460.)

This comprises, 1st, a building, called a pavilion; 2d, a motor; 3d, a self-acting moderator for regulating the speed of the motor; 4th, an attractor or expanding vessel to be employed in lieu of a pump for raising water. It appears to consist of a windmill within a building, with contrivances for opening and shutting the windows by which the wind enters, &c.

PHILLIPS, J. *Improved apparatus for supporting and propelling the human body in water.* Dated May 23, 1857. (No. 1461.)

This consists in the employment of certain expanding and contracting floats or fans, attached either to the arms, legs, or feet of the swimmer, or to a rod worked by his hands, and supported by an eye in a waist-belt.

ROBERTSON, W. *Improvements in pistons, and in apparatus connected therewith.* Dated May 25, 1857. (No. 1464.)

In ordinary horizontal steam engines the weight of the piston causes serious wear between its lower side and the cylinder; here this is obviated by the working steam of the engine acting between the lower side of the piston and the cylinder, so as to relieve the parts from undue friction.

CROSSLEY, J. *Improvements in machinery for grinding and smoothing glass, marble, and other substances.* Dated May 25, 1857. (No. 1470.)

A bench is used for supporting the glass, &c., to be ground. At one end of the bench is a vertical revolving shaft, carrying a crank at its upper end. To this crank is attached a connecting rod, extending over the length of the bench. To this connecting rod are attached runners or rubbers, and at its centre is a stud connecting it to a radius bar, which rests at one end on a stand placed at one side of the bench, and which serves as a centre for it to work upon. When the crank revolves, that point of the connecting rod which is attached to the radius-bar describes a segment of a circle, but any point on either side describes a curve similar to an irregular ellipse, and if one runner large enough to grind the bottom, glass, &c., be used it will have a motion similar to that which women give to glass runners in smoothing glass.

TYLER, H. W. *Improvements in the permanent way of railways.* Dated May 25, 1857. (No. 1472.)

This relates to securing rails to their

chairs; also, to securing the ends of rails by means of fishing plates, and to securing chairs to sleepers, all by means of bolts, &c., of a peculiar construction, in connexion with locking plates previously patented by the patentee.

EARNSHAW, J., jun. *Improvements in the toothed coverings of rag machine cylinders, and in the machinery or apparatus for preparing the same.* Dated May 25, 1857. (No. 1476.)

This chiefly consists in so boring the covering pieces, and fitting the teeth, that they all stand in a radial position, and at uniform distances apart.

AUBERT, L. D. *Improvements in fastenings for securing rails in the chairs.* Dated May 25, 1857. (No. 1477.)

This consists, 1st, in uniting the rails end to end by pins, which project beyond the end of the one rail, and are received into holes in the other. Also, in fastening rails in their chairs, &c., by means of a fish plate fitted between the wedge and the side of the rail at the joint, furnished with pins which project into the rib of the rail.

UNDERHILL, W. S. *Certain improvements in wringing machines.* Dated May 25, 1857. (No. 1478.)

This consists in making the rollers used of vulcanised india-rubber.

NEWTON, W. E. *An improved mode of relieving the slide valves of steam engines from unnecessary pressure.* (A communication.) Dated May 25, 1857. (No. 1479.)

This consists in the formation of a steam chamber between the valve and its seat. This chamber is to be filled constantly with the steam from the steam-chest, so as to balance the valve to any extent desirable.

HENDRIE, R. J., jun. *An improvement in steam boiler and other furnaces.* Dated May 25, 1857. (No. 1480.)

The patentee conducts currents of heated air from the front of the furnace to the front and rear of the bridge through metallic or other flues, and causes the same to mingle with the flames and gases of combustion, and thereby prevent the passage of smoke from the fire-place.

COOK, J. E. *An improved composition for the prevention of the decay and fouling of ships' bottoms and other exposed surfaces.* Dated May 27, 1857. (No. 1481.)

This composition is made up of wood spirit, or methylated spirits of wine, shellac, strychnine, or atropia, and dragons' blood.

HART, W. *Improvements in signal lamps.* Dated May 27, 1857. (No 1482.)

This relates to railway hand signal lamps, and consists in adapting thereto a moveable slide divided into two portions, supplied with a ruby and a green glass, which, being moved between the light and the lens, produces either of the coloured signals.

PARKINSON, R., and J. STANDISH. *Improvements in machinery or apparatus used in the preparation of cotton, wool, flax, or other fibrous materials to be spun.* Dated May 27, 1857. (1489.)

This relates to a patent granted to John Standish, dated the 29th of Jan., 1853, and consists in dispensing with the spoons therein alluded to and passing the slivers from the drawing rollers over light pulleys or drums having arms or levers projecting from them, below which there are arms or levers placed upon an oscillating shaft near the coilers, to which shaft motion is imparted by being connected by a rod and levers to the ordinary oscillating shaft, &c.

HOLLAND, W. *Improvements in umbrellas and parasols.* Dated May 27, 1857. (No. 1490.)

This consists, 1st, in making ribs and stretchers of umbrellas of wire or sheet metal, manufactured either by rolling or drawing. The form the patentee prefers to give to the ribs and stretchers resembles in cross section two sides of an equilateral triangle; 2d, in manufacturing top notches and runner notches from short pieces of tube operated upon by a pair of dies.

ELLIS, W. I. *Certain improvements in steam engines.* Dated May 27, 1857. (No. 1491.)

This consists in the use of additional ports and valves placed within slide valves, the additional ports being opened and closed for regulating the exhaust by the steam acting on the additional valves; or these valves may be furnished with apparatus for opening and closing them.

CROMPTON, H. *Certain improvements in machinery or apparatus for stretching woven fabrics.* Dated May 27, 1857. (No. 1492.)

This consists in the use of pairs of rollers covered with wire cards, and sustained at each end by a framing. Between these rollers are two wheels or discs employed for stretching the fabric. The fabric is placed over and in contact with these rollers and discs, weighted rollers being placed upon the fabric to retain it upon the discs, and motion is imparted to the first or delivering rollers. Thus the fabric will be drawn through the machine, causing the discs to revolve by contact of the progressing fabric, which will thereby become stretched or distended widthwise as it passes over them.

LOW, R., and W. PRESS. *A certain new improvement, or new improvements, in the construction of vices.* Dated May 27, 1857. (No. 1493.)

The patentees effect the parallel opening and shutting of the jaws of vices by means of a parallel action composed of jointed ribs or bars.

SAVORY, J. *A machine for separating seeds, whitecoats, and dirt from wheat and seeds, awns and dirt from barley, and for cleaning and polishing wheat, barley, and other grain fit for market.* Dated May 27, 1857. (No. 1494.)

This invention cannot be described without engravings.

WELCH, E. *Improvements in fire-places and flues, and apparatus connected therewith.* Dated May 27, 1857. (No. 1495.)

This relates, 1st, to a kitchen range that combines a cooking range and a stove for warming cold air for the use of adjoining apartments; 2d, to a register stove, having increased radiating power, and forming also a stove for warming cold air for the use of the room in which it is placed, and for adjoining or upper apartments; 3d, to a new cottage fire-place or grate and portable ovens. It also relates to improvements in circular flues and chimney-pots.

CODET-NEGRIER, J. L. *Improvements in the manufacture of boots, shoes, harness, and other articles.* Dated May 27, 1857. (No. 1497.)

This relates to the manufacture of shoes, boots, &c., by uniting the several parts with a composition composed of india-rubber, gutta-percha, and gum lac.

BACQUEVILLE-PIETERS, V. *Improvements in outside blinds or shades for windows, doors, and other places.* Dated May 27, 1857. (No. 1498.)

This consists in forming such erections so that they collapse in the manner of a fan, and may be thrown out or collapsed by cords and pulleys.

CRESSWELL, R. *A new article, to be called "typha velvet," suitable for carpets, furniture, hangings, wearing apparel, and other useful purposes.* Dated May 27, 1857. (No. 1499.)

This consists in closely affixing on the surface of cloth, skins, &c., properly prepared, and faced with a layer of dissolved caoutchouc, &c., as a bond of union, the silky floral filaments of the plants of the several species of the family "typha," so that, when finished, the production will present a face resembling velvet.

BROOMAN, R. A. *Improvements in distilling and in apparatuses employed therein.* (A communication.) Dated May 27, 1857. (No. 1502.)

This consists of improvements upon, and additions to, inventions patented in Great Britain by the patentee, 24th Dec., 1855, and 11th April, 1857, and comprises a new arrangement of distilling cylinders; dispensing with the pipes by which communication is established between the cylinders; and fitting to each cylinder pipes which communicate directly with a vessel at the base of the rectifying column, &c.

PETROVITCH, M. *The improvement of projectiles used with fire-arms.* Dated May 27, 1857. (No. 1505.)

Claims—1. The union of two elements hitherto only used separately in projectiles —viz., deep grooves and cavities. 2. The forcing of projectiles into the barrel of a fire-arm by simultaneous compression and expansion, produced by the action of the gases only.

GRAHAME, T. *Improvements in inland navigation.* Dated May 27, 1857. (No. 1506.)

Various forms of lifts on canals have been proposed in place of locks: amongst others, inclined planes, and barges or vessels navigating the canals have been caused to float over, and be received by, cars, trucks, or carriages, which have been moved up and down the inclines by steam-engines fixed on the land. Now, this invention dispenses with the fixed engines, and employs in place thereof the engines on board the boats which navigate such inland waters.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

HENSMAN, W. *Improvements in drills for sowing seeds and depositing manure.* Dated May 22, 1857. (No. 1443.)

The inventor supports the end axles of the seed or manure box in bearings connected with a scale beam, and thereby causes the box to assume a horizontal position when passing over inclined ground.

WHITAKER, E., A. LAW, and J. FLETCHER. *Improvements in steam-engines.* Dated May 22, 1857. (No. 1444.)

This consists,—1st. In a construction of cam for varying the periods of cutting off the steam. 2. In an arrangement of cam for cutting off the steam by the ordinary slide valve, in order to work expansively. Also, in the employment of a certain form of valve to be used after the manner of expansion valves.

PARSONS, P. M. *Improvements in making moulds for casting railway chairs and other articles in metal, and in apparatus for that purpose.* Dated May 22, 1857. (No. 1445.)

This consists in so constructing the moulding boxes, patterns, &c., that the mould formed by ramming the sand into the box is separated from the pattern by

turning the moulding box around a centre connected with the pattern.

WRIGHT, J. T., and E. P. WRIGHT. *A new or improved manufacture of cloths or coverings for railway trucks and other vehicles, ricks, and other such like purposes.* Dated May 22, 1857. (No. 1446.)

This consists in forming the coverings by joining the fabric by junctions which lie diagonally across the cloth, and inclined at nearly the same angle to any two adjacent sides, and in sometimes adding bands or gussets.

ENGLEDUE, J. R., and W. CULLIS. *Improvements in ventilators for ships' cabins, apartments, and places.* Dated May 22, 1857. (No. 1449.)

The inventors construct a frame fitted with pieces of metal, &c., so curved that when the series is mounted on the frame the surface shall present risings and depressions, so as not to admit of seeing from the one side anything on the other side, and yet allow spaces for the supply of air, &c.

EFFERTZ, P. *Improvements in machinery for making bricks.* Dated May 22, 1857. (No. 1451.)

Here two quadrangular vessels are employed in which pistons work, and on the top of the pistons clay is fed by endless chains of buckets, and as the clay falls from these buckets it has to pass through a frame, to which a rapid motion is given, and which contains a series of knives. Over the clay in the vessels frames of moulds (open both at top and bottom) are placed, and over the frames of moulds a covering plate. As the pistons rise they bring up the clay on them, force it into the moulds, and then recede. Afterwards the covering plates are turned back, and the frames of moulds are removed with the bricks in them.

DUPLAIS, N. J. H. *Certain improvements in the manufacture of felt hats and bonnets.* Dated May 23, 1857. (No. 1454.)

This consists in the application of wool or cotton shearings to the carcases of hats, within or without, in a certain manner.

COULON, P. F. *Certain improvements in velveting paper and textile fabrics.* Dated May 23, 1857. (No. 1455.)

This consists in the use of animal hair for replacing the ordinary shearing for producing a velvet coating on painted paper and textile fabrics.

RANKIN, J. *Improvements in ventilators.* Dated May 23, 1857. (No. 1457.)

The inventor makes a frame of tin. To each side of this frame he fixes a number of small grooved frames or holders, which work on centres or pins. Into each grooved frame he slides a strip of glass, and he has a vertical lever to which he connects each of the grooved frames, so that when the lever is pulled down it opens all the slides or plates of glass at the same time, and when the lever is released they close by means of an elastic spring.

BULLOCK, T. *The construction of water-closets upon the principle of self-action and self-cleansing, called the self-cleansing water-closet.* Dated May 25, 1857. (No. 1462.)

The chief features here are the closing of the pan at the bottom by the descent of the seat and pan attached, the letting out of the contents of the pan by the rising of the seat and pan, and the prevention of wind getting into the pan.

RODD, W. J. H. *A method of sailing or propelling a vessel or vessels out of or on the surface of the water.* Dated May 25, 1857. (No. 1463.)

This consists in supporting a ship out of the water, or on the surface, by means of air-tight drums, and propelling it by fixing floats upon the same.

SHEARD, S. C., and G. UNDERWOOD. *Certain improvements in supplying boilers with water, generating steam, and consuming smoke, and which said improvements are applicable to marine, locomotive, stationary, and other boilers.* Dated May 25, 1857. (No. 1465.)

Here the water is conducted in a cold state into a cistern at the back of the furnace, and from thence takes a tortuous course backward and forward, through a series of connected tubes which form an inner set of fire-bars, until it again enters the cistern in a boiling state, ready to be pumped into the boiler. The arrangement of furnaces for consuming smoke consists in applying vertical or inclined central or side air-way chambers, which are supplied with air from air-ways, passing back from the front of the fire hole to a hollow bridge, for supplying the chambers with air from without.

NEWTON, W. E. *Improved counting apparatus applicable for counting envelopes, cards, printed papers, or other articles that require to be put up in packets or parcels containing fixed numbers.* (A communication.) Dated May 25, 1857. (No. 1466.)

In order to count the articles delivered, say from an envelope machine, the envelopes are delivered in a plate mounted horizontally on an upright shaft, contained in a rectangular box placed on a horizontal rotating plate below. From some part of the machine motion is communicated to toothed wheels, which are caused to move forward one tooth for every envelope

delivered, and the teeth of these wheels are so arranged that at, say every twenty-fifth envelope, they will act upon trip levers, which will, when released, allow the receptacle to rotate on an axis one quarter of a revolution, so that every quarter of a hundred envelopes will be placed at right angles to the quarter of a hundred immediately preceding. Provision is made for the descent of the plate on which the envelopes are deposited.

FORD, H. W. *Improvements in apparatus for facilitating the draft and locomotion of carriages.* Dated May 25, 1857. (No. 1467.)

This consists in the use of detached circular rings for carriages to roll upon, the wheels bearing upon their interior surfaces, while their exterior rolls upon the road.

COUTANT, A. *Improvements in forging and rolling iron wheels for railways.* Dated May 25, 1857. (No. 1468.)

This consists in manufacturing railway wheels of wrought iron or steel in a single piece without spokes by shaping under a hammer, and subsequent rolling.

SZERELMEY, N. C. *Improvements in preparing combinations of materials for coating wooden and iron ships or vessels.* Dated May 25, 1857. (No. 1469.)

This comprises four compositions composed of a great variety of ingredients applied successively to the ship's bottom. After the fourth coating has been applied and is half-dry the inventor covers it with coal ash, and when dry polishes it with pumice stone. Another coating of the last composition is then applied, and the ship is ready for sea in 3 or 4 days afterwards.

FOX, W. *Improvement in the manufacture of steel pens.* Dated May 25, 1857. (No. 1471.)

This consists in causing the sheet steel to be hardened, tempered, and cleansed before cutting out the blanks.

COGAN, H. *An improved adjustable connection or joint, particularly applicable to agricultural implements.* Dated May 25, 1857. (No. 1473.)

This consists in the use of a threaded rod fixed to the frame of the implement to which coulters, tines, shares, hoes, &c., are to be connected.

BROOMAN, R. A. *Improvements in pumps.* (A communication.) Dated May 25, 1857. (No. 1474.)

This consists in the use of a hollow sucker and of certain peculiarly-constructed valves. Each valve is formed of a disc of caoutchouc with two cuts therein; upon the sucker being worked, liquid is drawn through a pipe terminating in a rose, through the bottom valve into a chamber, and then through a hollow sucker, passing in a direct line through the pump.

MILLE, M. J. A. *Improvements in producing gas.* Dated May 25, 1857. (No. 1475.)

Here the following materials are used:—coals 20 to 30 parts; flowers or blossoms of trees 35 to 40 parts; the stones or kernels of fruits 35-100th to 40-100ths. These are mixed together, and are heated, and the gas purified by the ordinary apparatuses.

DAVIES, C. D. *Improvements in the application of coir or cocoa-nut tree fibre as a substitute for hair in the manufacture of cloths used in seed-crushing.* Dated May 25, 1857. (No. 1483.)

Instead of the cloths manufactured of hair called "havis" employed in crushing linseed the inventor applies coir made into ropes as a substitute.

CLARK, W. S. *Improvements in machines for producing artificial ices from cream and other liquids.* (A communication.) Dated May 27, 1857. (No. 1484.)

This consists of two concentric cylinders closed at the lower ends. The lesser is filled with ice and salt, and placed inside the greater, which is also surrounded with ice. An annular space is left between them, wherein the cream is placed, and in which four circular concentric rising and falling planes are placed for planing the thin layers of ice from the inner surface of the larger and the outer surface of the smaller cylinder, as they are elevated and depressed by vertical rods.

CLARK, W. S. *Improvements in printing-presses.* (A communication.) Dated May 27, 1857. (No. 1485.)

This relates to portable presses, in which a radiating cone-shaped roller is used for giving the impression, and consists in a means of so adjusting the conical roller as to easily adapt it to the surface of the type from which the impression has to be taken, in connexion with the conical roller.

CLARK, W. S. *Improvements in copying-presses.* (A communication.) Dated May 27, 1857. (No. 1486.)

This consists of an arrangement of links and levers at the opposite sides or ends of the press, by which the platten and bed plate are thrown apart or drawn together, and are so arranged that when the pressure is applied it forms a clamp thereto, occupying no more space than the book alone.

CLARK, W. S., and B. MOORE. *Improvements in churns for producing butter.* (A communication.) Dated May 27, 1857. (No. 1487.)

This consists "in giving such direction

to the cream placed in the tub of the churn by the action of the agitator that it shall assume the character of a screw."

SUTCLIFFE, J. *Improvements in water-gauges.* Dated May 27, 1857. (No. 1488.)

To indicate the height of the water in steam boilers, the inventor places a box at the front or side of the boiler, at the water level, and to this box he fixes a window of glass, the box being packed with elastic packing. At the other end of the box he places valves opening inwards to the boiler, which are arranged in connexion with a handle outside, so as to be opened at pleasure. By means of the valve the box can be closed should the window be broken.

SAWNEY, W. *Improvements in winnowing or corn-dressing machines.* Dated May 27, 1857. (No. 1496.)

This consists in arranging the screen so as to be less inclined, and imparting to it by certain mechanism a vertical shaking motion instead of the ordinary horizontal motion. By this arrangement the screen may be made the full width of the machine.

CRESSWELL, R. *Improvements in grease or lubricating boxes for axles and other rotary parts of machinery.* Dated May 27, 1857. (No. 1500.)

Here the axle, &c., is enclosed within a box, having an intervening flange or washer, with a reservoir sunk in its upper part for the reception of the grease, and a groove communicating above with the reservoir and below with the axle, &c., for the passage of the unctuous material. Around these is placed a hollow revolving cylinder which receives the grease after it has done its work, and by its motion conveys it to the upper part where, meeting with a conductor it is directed into the reservoir from whence it started, to be re-employed as before.

WILLIAMSON, J. and F., J. WRIGHT, and J. WADSWORTH. *Improvements in looms.* Dated May 27, 1857. (No. 1501.)

This consists in giving various motions to a leaf of heddles, by means of levers or treddles put in motion by tappets, and kept in their position by catches; which motion can be changed so as to produce satin or twill and plain weaving, or *vice versâ*, in one and the same piece of woven fabric, by means of other levers acting upon the treddles, and throwing them in or out of gear. It also consists in having catch wheels of different diameters to the same loom, which can be thrown into or out of gear by means of levers connected with the catches to the wheels; and by this means the inventors vary the number of picks or threads per inch in one and the same piece or woven fabric.

JOSSA, F. *Improvements in hammers worked by atmospheric pressure.* Dated May 27, 1857. (No. 1503.)

A bored cylinder is closed at top and open at bottom, and in it is fitted an air-tight piston rod carrying the hammer. Below the cylinder cover a 2-inch pipe enters, and is connected by a curve upwards in the pipe with a large metal chamber, having hemispherical ends. The bottom of the pipe has an open mouthpiece; a junction pipe is bored and contains a piston fitted air tight. In connexion with the metal chamber is an air machine which resembles cylindrical bellows, only the valves open in opposite directions. This produces in the chamber a vacuum. By pressing down a lever the piston is moved downwards; the air rushes from the cylinder into the exhausted receiver, and the hammer is raised by atmospheric pressure. When required the lever is let go or moved up, the air enters the cylinder again, and the hammer falls.

DANNE, L. J. A. *Manufacturing gutta-percha glue, and applying the said glue to various new purposes.* Dated May 27, 1857. (No. 1504.)

This consists in melting gutta percha with resin in a pan, and mixing with it when fluid, if required, some hard powdered material, such as glass, sand, emery, pumice stone.

PROVISIONAL PROTECTIONS.

Dated December 23, 1857.

3148. William Nunn, of Hackney, gentleman. Improvements in stereoscopic apparatus.

Dated January 7, 1858.

26. François Philippe Cappon, watchmaker, of Marans, France. Self-acting pads for doors, shutters, windows, or other similar shuttings.

Dated January 18, 1858.

80. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., Editor of the *Mechanics' Magazine* and patent agent. Improvements in machinery for the manufacture of pipes and tubes. A communication.

Dated January 23, 1858.

125. Charles Fréderic Vasserot, of Essex-street, Strand. A single and double-acting machine with electro-magnetic motive power. A communication from Bouvery and Crestine, of Lyons.

Dated January 26, 1858.

137. Pearson Hill, of Hampstead. Improvements in machinery for making cams and for cutting and shaping metals and other materials.

139. George Price Simcox, of Harpurhey, near Manchester, carpet manufacturer. The application of certain materials in the manufacture of carpets.

141. William Edward Newton, of Chancery-lane. Improved machinery for mining coal and other mineral substances. A communication.

143. William Davis Hirst, of Mount-street, Grosvenor-square. A stand for soda-water bottles and other bottles of a similar form.

144. John and Ezra Harthan, of Timbersbrook, Chester, silkmen. An improved engine for obtaining motive power.

145. Ralph Heaton, Jun., and George Heaton, of Birmingham, manufacturers. An improvement or improvements in annealing metals.

Dated January 27, 1858.

147. Arthur Bird, of Birmingham, upholsterer. A new or improved spring platform or mattress for bedsteads and other articles used for sitting, lying, or reclining upon.

148. George James Wainwright, of Dukinfield, Chester, cotton-spinner. Improvements in drawing fibrous materials.

149. John Wignall Midgley, of Keighley, York, mechanic. An improved construction of covered roller to be used in preparing and spinning machinery.

Dated January 28, 1858.

150. James Murdoch Napier, of Vine-street, York-road, Surrey, engineer, and William Thorburn, of Sussex-place, York-road. Improvements in machinery for planing, shaping, and slotting.

151. Constantine Nicolaus Kottula, of Liverpool, soap-manufacturer. Improvements in the manufacture of neutral soap.

153. Louis Caemmerer, of Ghent, Belgium, mechanician. Improvements in the apparatus for cleaning the top rollers and fluted rollers of the different spinning machines.

154. William Spence, of Chancery-lane. An improved pot for chimneys and ventilation. A communication.

155. Edmond Liouvil, of Paris, gentleman. Improvements in apparatus for aërated liquids.

156. John Henry Johnson, of Lincoln's-inn-fields. Improvements in the manufacture of metal pipes, and in the apparatus employed therein. A communication from C. F. Sebille, of Nantes.

157. Thomas Armitage, of Hood-street, Coventry, elastic web manufacturer. Improvements in elastic fabrics.

Dated January 29, 1858.

158. William Treleaven Fox, of Birkenhead, master mariner. Improvements in the bending and reefing of ships' and other vessels' sails, together with a new application for the leeches and foot.

159. John Bethell, of Parliament-street, Westminster, gentleman. Improvements in the manufacture of coke and fuel.

160. William Henry Tooth, of Sumner-street, Southwark, engineer. Improvements in polishing plate glass, sheet glass, and other substances.

162. John Elder, of Glasgow, engineer. Improvements in the arrangement or construction of steam engines and boilers.

163. George Chapman, of Leicester, manufacturer. An improvement in socks, drawers, and other garments made of knitted fabrics.

164. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., Patent Agent. Improvements in apparatus for measuring water, gas, and other fluids. A communication from E. A. Chameroy, jun.

165. Robert Weare, of Plumstead, Kent. Improvements in galvanic batteries.

166. James Wotherspoon, of Glengarnock Iron Works, Ayr, smith. Improvements in railway brakes.

167. James Goodwin, of Milton, Stirling, dyer. Improvements in the treatment, preparation, and cleansing of textile fabrics and materials.

168. Herbert William Hart, of Birmingham, gas engineer. Improvements in regulating the pressure of gas.

Dated January 30, 1858.

169. William and Charles Kaye, of Lockwood, near Huddersfield, wheelwrights. Improvements in mattocks, picks, hoes, hammers, and similar implements and tools.

170. George Garden Nicol, of New Broad-street, Agent. Improvements in balls or projectiles. A communication from A. M. Aitken, of Singapore.

171. Charles Niellon, of Lime-street, City. Improvements in the manufacture of manure from sewage waters.

172. John Newling, of Park-street, Grosvenor-square, surgical instrument maker. An improved truss for hernia.

173. Richard Coleman, of Chelmsford, agricultural implement maker. Improvements in agricultural implements.

174. John Augustus Bouck, of Manchester, chemist. Improvements in the manufacture of sulphate of copper, and in obtaining certain useful products from such manufacture.

175. Thomas Taylor, sen., and Thomas Taylor, jun., of Manchester, Henry Nelson, of the same place, machinist, and Henry Spencer, of Rochdale, agent. Improvements in steam engines, and apparatus connected therewith.

176. Peter Ashcroft, engineer to the South Eastern Railway. An improved mode of supporting the rails of railways in their chairs.

Dated February 1, 1858.

178. William Kemble Hall, engineer, of Cannon-street. Improvements in the manufacture of artificial leather.

180. George Bartholomew, of Linlithgow, edge tool maker. Improvements in horse shoes, and in attaching the same to the horses' feet.

182. William Edward Newton, of Chancery-lane. An improved clasp or fastening for joining the ends of belts or bands. A communication.

184. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., Editor of the *Mechanics' Magazine* and Patent Agent. Improvements in burners for generating and burning gas from hydro-carbon fluids. A communication.

186. William John Hay, of Southsea, Hants, experimental chemist. An improved composition suitable for covering the caulking of ships and other like purposes, for uniting wood and other substances, for filling up seams, and for use as a waterproof composition generally.

Dated February 2, 1858.

188. William Edward Newton, of Chancery-lane. Improvements in obtaining certain compounds of nitrogen to be applied in the composition of artificial manures, and for other useful purposes. A communication.

190. James Sholl, of Victoria-grove West, Stoke Newington, ink manufacturer. Improvements in the manufacture or preparation of paper for writing and copying purposes.

192. John Gray, of Colinton, near Edinburgh, newspaper proprietor. Improvements in printing machinery.

Dated February 3, 1858.

194. John Morris, of Great Bridge, Stafford, boot manufacturer. An improvement or improvements in boots and shoes.

196. Anthony Nicholas Armani, of Haverstock-hill, manufacturer. Improvements in rail or tramways for streets and ordinary roads.

198. William Edward Newton, of Chancery-lane. Improved apparatus for raising and lowering the skirts of ladies' dresses. A communication from L. A. F. Dyonnet, of Paris.

202. William Clark, of Chancery-lane. Improved hydraulic apparatus for obtaining motive power. A communication from C. Rostaing, of Lyons.

NOTICES OF INTENTION TO PROCEED.

(From the "London Gazette," February 16, 1858.)

2467. J. de la Haye and M. Bloom. Improvements in laying down submarine telegraphs.

2540. A. Seyferth. The employment of sulphuret of carbon for motive purposes, and engines and apparatuses for applying and regenerating the same.

2542. W. Pursall. Improvements in the manufacture of eyelets.

2544. G. Duncan and W. J. Jellicorse. An improved smoke consuming furnace.

2555. E. Cavendy. An instrument in taking zenith observations at sea (when the horizon is obscured) of any planet.

2559. E. Vigers. Improvements in the construction of wrought iron beams and girders.

2565. A. Applegath. Improvements in printing machines.

2570. A. Boyd. Improvements in machinery for spinning and doubling.

2571. T. Forsyth. Improvements in the construction of metallic pistons.

2575. C. Barlow. Improvements in buoyant or life preserving garments. A communication.

2577. W. G. Craig. Improvements in the manufacture of railway carriage and other wheels formed of cast metal or having cast metal naves or bosses.

2586. S. Walmsley. Improvements in the construction of footsteps for upright shafts and spindles.

2589. J. Harland. Improvements in purifying and cleansing clay, and in the manufacture of bricks, tiles, and similar articles therefrom.

2595. P. A. Calvert. Improvements in machinery for ginning cotton, and for burring and cleaning cotton wool and other fibrous materials.

2597. C. N. Leroy. Preventing accidents and collisions on railways.

2599. A. Barlow. A Jacquard apparatus dispensing with the use of cards and the usual mode of designing for figured weaving.

2600. W. H. Myers. An improved means for signals on railways, being a system of signals for railway trains in motion, or otherwise, comprising communications between guards and engine-drivers, station-masters, and others, the same apparatus being applicable as fog, danger, and accident signals, the same apparatus being also a communication from station-masters (or their servants) including point and signal men to guards and engine-drivers, for passengers by means of glass or metallic pendant signals.

2601. R. Porter and J. Porter. Improvements in machinery for the manufacture of bricks.

2612. W. Brookes. Improvements in combing wool and other fibres. A communication.

2620. J. Yates. Improvements in machinery or apparatus used in preparing and spinning fibrous materials.

2625. J. F. Swinburn. Improvements in fire-arms. A communication.

2631. J. Parker. An improved method of fitting and working Venetian and other similar blinds used as ventilators or screens, or both.

2632. J. C. Plomley. An improved method of drying malt, hops, and other produce.

2637. R. G. Balderston. Apparatus for cultivating land.

2642. J. Gibbs. A method of treating phormium tenax, in order to render it fit for the manufacture of pulp.

2653. R. A. Brooman. An apparatus for scoring games and points at games. A communication.

2656. R. J. Badge. An improved mode or method of securing railway chairs to the sleepers.

2672. H. Wimball. Improvements in machinery or apparatus for the manufacture of bricks, tiles, pipes, and other articles of a similar nature.

2673. E. Cockey, H. Cockey, and F. C. Cockey. Improvements in regulating the flow of fluids.

2678. M. A. F. Mennons. An improved hydraulic press. A communication.

2694. M. A. F. Mennons. Certain improvements in machinery for the preparation of peat. A communication.

2748. T. C. Cook. Improvements in machinery for cutting, framing, and packing lucifer and other like wood matches.

2751. J. Craven. Improvements in machinery or apparatus used in weaving.

2753. G. W. Robinson. Improvements in clod crushing rollers.

2755. J. B. Fraser. An improvement or improvements in lubricating shafts, axles, screws, and other articles requiring lubrication.

2799. F. Higginson. Submerging, extending, and laying down submarine, electric, magnetic, and every other description of submerged or immersed electrical telegraph cables, wire ropes, and combined wire, gutta percha, spunyarn, or other compound electrical cables whatsoever.

2837. T. Rowcliffe. Improvements in machinery for making and pressing bricks, drain pipes, and tiles, and in preparing material to be used for such like purposes.

2846. J. R. Cochrane. Improvements in the treatment or manufacture of ornamental fabrics.

2931. J. H. Johnson. Improvements in ships' signal lanterns. A communication.

3101. E. Highton. Improvements in electric telegraphs.

47. E. H. Bentall. An improved arrangement of portable gearing apparatus, for the application of horse power, principally for driving various kinds of agricultural machines or implements.

95. R. Martin. Improvements in machinery or apparatus for effecting the shipping of minerals in tidal situations.

96. T. Heppleston. Certain improvements in machinery or apparatus for winding yarns or threads.

112. H. Smith. An improvement or improvements in the manufacture of iron hurdles and fencing.

118. J. Brown. Certain improvement in looms.

119. J. Brown. Certain improvements in Jacquard machines.

130. J. Craven, W. Hey, and C. Worsnop. Improvements in actuating rotary shuttle boxes of looms.

138. Sir H. Stracey. An improved cartridge.

144. J. and E. Harthan. An improved engine for obtaining motive power.

166. J. Wotherspoon. Improvements in railway brakes.

188. W. E. Newton. Improvements in obtaining certain compounds of nitrogen to be applied in the composition of artificial manures, and for other useful purposes. A communication.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

308. William Beckett Johnson.
313. Edward Sparkhall.
321. George Rennie.
322. John Ramsbottom.
327. Richard Shirley Harris.
328. John Foster.
335. John Henry Johnson.
346. Christophe François Delabarre.
355. Samuel Barlow Wright and Henry Thomas Green.
481. Alexander Theophilus Blakely.

LIST OF SEALED PATENTS.

Sealed February 12th, 1858.

2158. William Smith Wheatcroft and James Newton Smith.
2159. John Alleyne Bosworth.
2167. Charles Gumm.
2169. Samuel Draper.
2190. William Henry Miller and Henry Edward Skinner.
2194. Thomas Keddy.
2214. Amos Pierce Chamberlain.
2272. François Xavier Gentil and Eugene Gentil.
2284. William Clark.
3014. Samuel Clarke.
3080. Edwin Turner and John Charles Pearce.

Sealed February 16th, 1858.

2179. Archibald Smith.
2191. Charles Nightingale.
2196. Samuel Bottomley, James Bottomley, and Thomas Bottomley.
2200. Pier Alberto Balestrini.
2204. Ferdinand Potts.
2208. James Murdoch Napier.
2212. Richard Archibald Brooman.
2217. Thomas Ingram.
2219. Joseph Glover and John Bold.
2221. Victor Hippolyte Laurent.
2222. Peter Ashcroft.
2223. Henry Cartwright.
2225. Jules Dufau.
2233. Ludvig Levison.
2239. Alfred Hamilton.
2241. Thomas Macauley.
2267. William Harling, John Matthew Todd, and Thomas Harling.
2286. George Hallen Cottam and Henry Richard Cottam.
2295. Robinson Elliott.
2308. Perry G. Gardiner.
2310. John Yuil Borland.
2332. William Lewis and William Henry Lewis.
2371. Charles Lungley.
2687. John B. Slawson.
2777. George Hallen Cottam and Henry Richard Cottam.
2938. George Lowry.
2995. Joseph Francis and Charles Manby.
3054. John Chadwick and Arthur Elliott.
3111. Samuel Darling.
3112. Charles Winslow.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

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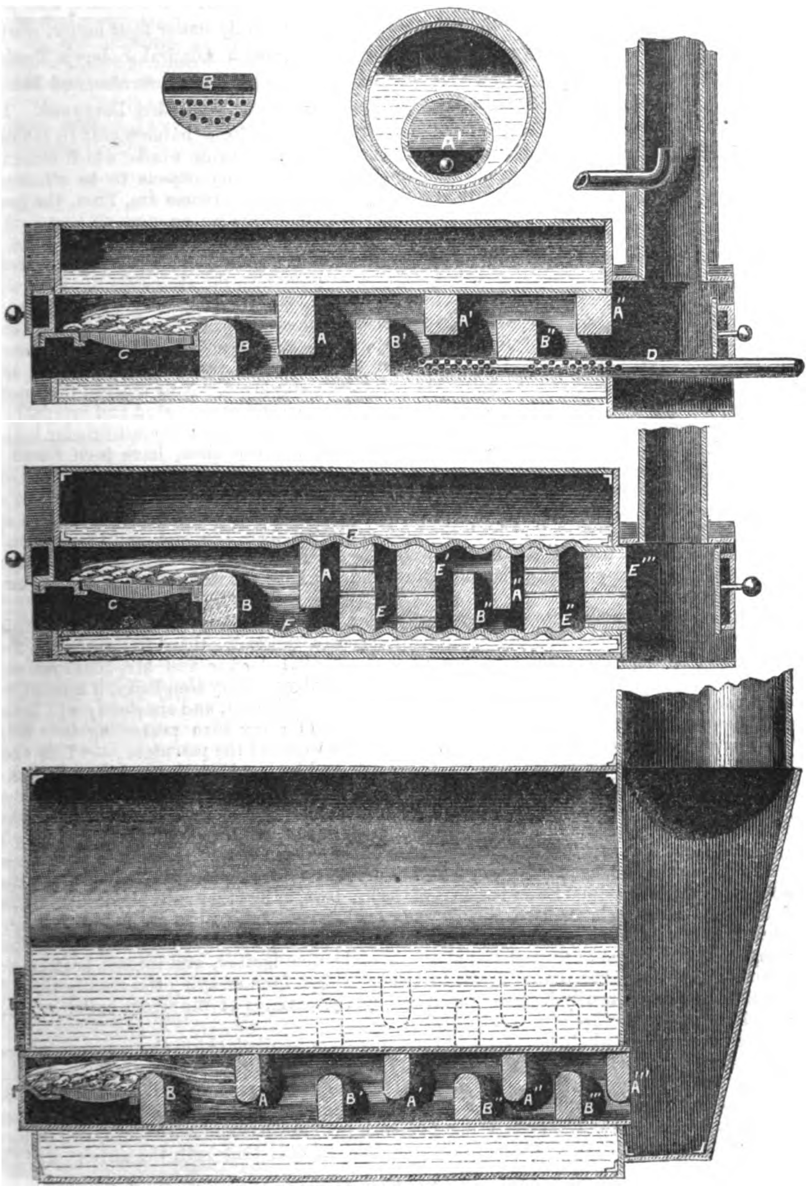
IMPROVED PATENT FURNACES.

Fig. 3. Fig. 2. Fig. 1.

Fig. 4.

Fig. 5.



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IMPROVED STEAM-BOILER AND OTHER FURNACES, PATENTED BY ADMIRAL TUCKER, R.N., AND MR. G. BLAXLAND.

Every one who has even a very limited knowledge of the expense incurred in the manufacture and almost incessant repairs of multitubular marine boilers, especially such as are employed in our steam gunboats, must feel the desirability of effecting some great and important simplifications in their construction. It is not surprising, therefore, that professional gentlemen, who have the evils alluded to constantly under their notice, should seek to contrive such improvements; which is the case with Admiral J. Jervis Tucker, R.N., who was recently the Superintendent of H.M. Dockyard at Sheerness, and Mr. G. Blaxland, the Superintendent Engineer of the Steam Factory at that Dockyard. The scientific considerations which operated upon these gentlemen as inducements to attempt beneficial changes cannot be better set forth than in the following words, which form the introduction to the specification of their patent:—"The primary objects to be attained," say they, "in, and in connexion with steam-boiler and other furnaces are, First, the generation from the fuel consumed in such furnaces of as large an amount of heat as it is possible for it to evolve; and, Secondly, the transfer to the substance or substances to be evaporated or heated of as large a portion of the heat generated as it is possible to extract from the products of combustion before they pass away into the atmosphere. It is with the first of these objects in view that the various smoke-preventing furnaces now known have been contrived; for as the combustion of the fuel is improved, and the heat generated thereby increased, the quantity of smoke (properly so-called) emitted from the furnace is proportionately diminished. And it is with the second of these objects in view that multitubular steam-boilers have been very extensively employed. Now most of the smoke-preventing apparatuses hitherto contrived have been either complicated and expensive in their construction, or troublesome in their operation; and most of the multitubular boilers hitherto used, especially those applied to high speed marine engines, have been found to entail great expense upon their owners, in consequence of the rapidity with which their tubes and tube-plates are destroyed by the action of the furnace flame. It appeared to us, therefore, highly desirable so to construct furnaces and adapt them to steam boilers and other heating apparatuses, that both the heat generated from the fuel, and the portion of that heat which is transmitted to the water or other substance, shall be comparatively great; while the expense incurred in fitting and working the said furnaces shall be comparatively small."

Nothing can be more correct scientifically than the views thus expressed, and nothing can be more desirable, in connection with furnaces generally, than the economy thus aimed at. The actual improvements to which Admiral Tucker and Mr. Blaxland were conducted by their experiments are characterized by extraordinary simplicity, it is true; but the time for desiring complexity in furnace construction is past, and simplicity will henceforth be esteemed as one of the primary advantages of every plan possessing it. What their improvements are shall also be set forth in the words of the patentees:—"This end" (set forth in the preceding extract) "we have attained by our invention, which consists in placing within the furnace a series of hanging and rising or complete blocks or bridges composed of fire-clay or other similar and suitable material, such blocks or bridges being placed at suitable distances apart, and perforated, or not, with numerous holes as may be required; and in providing for the admission of the oxygen of the atmosphere to the gases evolved from the fuel, by means of perforations or apertures formed through the bridge which supports the fire-bars, and below the level of the fire-bars, or by other suitable means. On the fire of the furnace being lighted, the blocks or bridges before described are gradually heated until they become incandescent; the gases evolved from the fuel then impinging upon them, mixed with the oxygen of the atmosphere, become ignited, and intense heat is produced. This heat is prevented by the blocks or bridges from escaping too readily through the flue, and consequently becomes taken up by the surfaces of the steam boiler or other vessel exposed to the fire of the furnace."

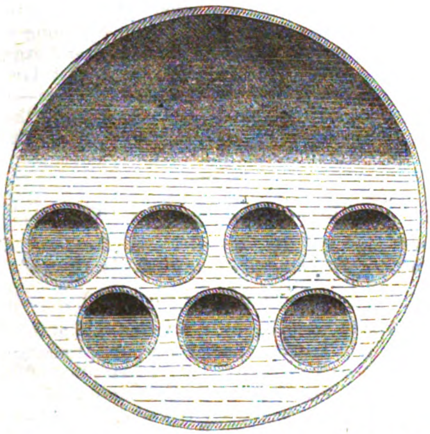
The patentees very judiciously guard their invention by disclaiming the mere use of fire-clay, however proposed:—"We are aware," they say, "that blocks or slabs of fire-clay have before been used in the construction and fitting of furnaces, and we, therefore, lay no claim to the mere employment of that or similar material. But a series of hanging and rising, or complete blocks or bridges of such material has not, we believe, before been used after the manner of our invention, and it is in this that both the novelty and the

utility of our invention consist." "We entirely dispense," they continue, "with the use of numerous tubes or groups of tubes in the boilers to which our improved furnaces are applied, and we have found from experiment that both the combustion of the fuel and the evaporation of the water are improved by the substitution of our invention in any given case. Our invention is also attended by the additional advantage of non-production of smoke. In some cases we find it advantageous to form the heating surface of the boilers or other vessels to which our improved furnaces are applied either wholly or partially of corrugated metal, but this we do not claim as part of our invention, as corrugated metal has before been applied to the same purpose."

In the drawings annexed to the specification of the patentees' invention they have represented the manner in which their improvements may be applied to the furnaces of various forms of steam boilers. From these we select an example or two:—

Fig. 1, of the annexed engravings is a vertical longitudinal section, and fig. 2 a transverse section of a cylindrical boiler with an internal furnace, in which a series of six fire-clay blocks or bridges is introduced. A, A′ A″, are the hanging, and, B, B′ B″, the rising bridges.

Fig. 6.



The fire-bars, C, are supported by the first rising bridge, B, as shown, and this bridge is perforated for the admission of air below the level of the fire-bars, as indicated by the circles in fig. 3, which is a view of the bridge, B, detached. D, is a perforated pipe entering from the back of the furnace. Through this pipe a second supply of atmospheric air enters to the gases between the bridges, B″ A″. The remaining parts of the boiler, being of the usual construction, require no description. Fig. 4, is a longitudinal section of a furnace with four rising and falling bridges, B, A, B″, A″. and with four perforated complete bridges, E, E′, E″, and E‴. It will be observed that, in order to ensure a better contact of the gases with the heated bridges, the perforations in E, E′, and E″, E‴, are made at different levels.* In Figs. 5 and 6, are represented a longitudinal and transverse section respectively of a cylindrical boiler with two sets of internal furnaces, one above the other. In this boiler the number of furnaces is greater than usual, as the patentees have found it advantageous in some instances to increase their number and diminish their dimensions. A, A′, A″, A‴, are the hanging bridges of fire-clay, and B, B′, B″, B‴, are the rising bridges of the same material.

It is generally desirable to set forth the merits of a new invention by a reference to experimental facts, which we are fully able to do in the present instance as far as is desirable. It will not be necessary here, as it is in most similar cases, to detail the circumstances of the trials which have been made with boilers fitted with the furnaces of Admiral Tucker and Mr. Blaxland; for if it be known that merely a fair average rate of evaporation was attained by them their value will at once appear. No intelligent engineer, ndeed no intelligent person whatever, can doubt that immense advantages would be gained n our gunboats, for example, if their costly boilers, which are perpetually burning out and breaking down—under the most exigent circumstances frequently—were replaced by

* These perforations are much more numerous than the figure appears to indicate.

others which, though of even less evaporative power, were secure and reliable, and such as might be sent on active service for months together without the least probability of their becoming disabled. The efficiency of these vessels would unquestionably be increased ten-fold by the change. And these considerations lead us to notice certain rival—or, to speak more correctly, we hope—certain emulous efforts which have recently been made at Sheerness, in connection with the trials of the improved furnaces under notice. These efforts have, we believe, proceeded from Captain Halstead and some of the engineers of the steam reserve ships under his charge. The boiler devised by them is so far like that prepared for trial by Admiral Tucker and Mr. Blaxland that two bridges were employed, one at the ends of the fire-bars and the other a hanging bridge placed about half-way between that and the tube-plate. But it is so far unlike it that while in the one about 70 or 80 tubes were employed, the other was altogether without them. Happily the Admiralty ordered continuous trials of the two boilers, each for 144 hours. This was very judicious, inasmuch as the great point, we conceive, to be tested, was the ability to stand continuous wear with good average evaporation. Viewed in this light, the patent boiler has completely triumphed. We have not thought it necessary to trouble ourselves to get the official reports of the trials, since all comparison between the two boilers was rendered nugatory by the frequent breaking down and the violent priming of the Halstead boiler. The superiority of the other, in both respects, and its general excellence, have not, so far as we have heard, been questioned. As long ago as August last we ourselves had an opportunity of practically examining one of the patent boilers—or rather a boiler fitted with the patent furnace—at work in Sheerness Dockyard, and the high opinion we then formed of its advantages has been confirmed by subsequent consideration and experience.

LONDON FIRES IN 1857.

Twenty-seventh Annual Report. By Mr. William Baddeley, C.E., Inventor of the Portable Canvas Cisterns, Improved Jet-spreaders, the Farmer's Fire-engine, &c., &c.

(*Concluded from page* 176.)

A fire, nearly attended with serious consequences, took place in July last, on the roof of a bacon warehouse connected with the extensive premises of Messrs. Hearon and Co., wholesale druggists, in Bishopsgate-street. At a quarter-past seven o'clock, in the evening, the fired was observed by the neighbours, who sent for the firemen; on their arrival they found the lead flat covered with a wooden grating, and a number of clear glass bottles, filled with castor-oil, were placed on the parapet walls, in wooden stands made for the purpose of holding them. A quantity of saw-dust and other matters had collected beneath the grating, some oil had been spilt, which had become ignited by the bottle of oil acting as a burning-glass of considerable power. Several bottles of castor-oil were destroyed, the racks considerably damaged, and the lead flat melted. Persons dealing in oils, linseed-oil especially, cannot be too careful in preventing contact with saw-dust, cotton-waste, hemp, canvas, &c., as such unions form the elements highly favourable to spontaneous ignition.

During the present year a point of great importance has been disposed of, involving the right of commercial men to keep large quantities of combustible matters upon their premises. In the year 1855, Mr. Isaac Solly Lister, and Benjamin Biggs, were indicted at the Central Criminal Court for a public nuisance, in keeping and storing large quantities of wood naphtha and rectified spirits of wine in a warehouse in Suffolk-lane, between Cannon-street and Thames-street. It was stated on the trial that between 4,000 and 5,000 gallons of wood naphtha, and from 40,000 to 45,000 gallons of spirits of wine had been stored on their premises, and that the operation of mixing the two together was carried on on the premises by the aid of certain machinery, which rendered it more dangerous to the neighbourhood of a crowded city than gunpowder itself, producing in the event of ignition such a conflagration, as no amount of water that could be brought to bear upon it could extinguish. The defendants were found guilty, but judgment was reserved for the opinion of the Judges, as to whether, when the manufacture was carried on carefully, in the opinion of scientific men, its liability to danger made it a public nuisance. The case was then argued before the Court of Criminal Appeal, but they not agreeing, it came before the full Court, in the Court of Exchequer. After being re-argued, Lord Campbell delivered the opinion of the whole of the Judges, who, with the exception of the Lord Chief Baron, concurred in their judgment, that "the conviction in this case ought to be affirmed."

The following tabular analysis exhibits, in each instance, the occupancy of that part of the premises in which the fire originated, illustrating the comparative liability to accident by fire of various trades, manufactories, and private dwellings :—

Occupation.	Totally Destroyed.	Seriously Damaged.	Slightly Damaged.	Total.
Apothecaries, not having laboratories	—	1	2	3
Bacon-dryers	—	1	—	1
Bakers	—	4	7	11
Basket-makers	—	1	—	1
Beer-shops	—	6	4	10
Booksellers, binders, and stationers	—	7	16	23
Brewers	—	1	—	1
Brokers and dealers in old clothes	—	10	11	21
Builders	2	6	8	16
Butchers	—	—	4	4
Cabinet-makers	1	11	9	21
Cane dyers	—	2	1	3
Carpenters and workers in wood	4	35	25	64
Chandlers	—	17	13	30
Cheesemongers	—	3	2	5
Chemists, manufacturing	—	3	1	4
Churches	—	2	2	4
Coach-makers	1	—	1	2
Cocoa-nut fibre manufacturers	—	1	1	2
Coffee and chicory roasters	—	2	—	2
Coffee-shops and chop-houses	—	5	5	10
Colour-makers	—	2	—	2
Confectioners and pastry-cooks	—	3	6	9
Coopers	—	3	1	4
Cork-burners	—	2	—	2
Corn-chandlers	1	6	2	9
Cotton-wool, workers in	—	1	—	1
Distillers	—	1	—	1
,, tar	—	2	1	3
Docks	—	—	1	1
Drapers, linen, woollen, and mercers	—	18	21	39
Druggists, wholesale	—	1	—	1
Drysalters	—	—	1	1
Dyers	—	—	2	2
Eating-houses	—	—	6	6
Engineers, mechanical	—	3	2	5
Fancy-box makers	—	—	1	1
Farming stock	2	3	—	5
Feather merchants and dressers	—	—	2	2
Fellmongers	—	1	—	1
Firework maker	—	1	—	1
Floorcloth manufacturer	—	1	—	1
Flower makers, artificial	—	1	1	2
Founders	—	1	4	5
Foreign fancy goods, importers of	—	1	1	2
Fruiterers	—	—	1	1
Furrier and skin dressers	—	1	2	3
Gas works	—	1	2	3
Glue manufacturer	—	—	1	1
Grocers and tea-dealers	1	8	8	17
Hat makers	1	9	4	14
Hop merchants	—	—	1	1
Hotels and club-houses	—	2	2	4
Japanners	—	2	—	2
Lamp-black manufacturers	—	—	1	1
Laundresses	—	6	7	13
Leather cloth, patent, manufacturers	—	1	—	1
Lucifer-match makers	—	—	1	1
Malsters	—	1	—	1

Occupation.	Totally Destroyed.	Seriously Damaged.	Slightly Damaged.	Total.
Manure, dealers in	—	—	4	4
Marine store, dealers in	1	3	6	10
Mat-makers	—	1	1	2
Milliners and dress-makers	—	11	9	20
Musical instrument-makers	—	2	1	3
Mustard mills	—	1	—	1
Nurseryman	—	1	—	1
Oil and colourmen	—	4	5	9
Painted-baize makers	—	1	—	1
Paper stainers	—	2	1	3
Perfumers, manufacturing	—	1	—	1
Photographists	—	2	—	2
Playing-card makers	—	—	1	1
Plumbers, painters, and glaziers	1	2	5	8
Public buildings	—	—	3	3
Potteries	—	2	—	2
Printers, letter-press	—	6	4	10
,, copper-plate	—	1	—	1
Private dwellings	1	60	259	320
Provision-merchants	—	1	—	1
Rag-merchants	—	7	3	10
Railways	1	2	3	6
Rope-makers	—	—	1	1
Sale-shops and offices	—	21	25	46
Sail-makers	1	—	—	1
Saw-mills, steam	1	5	5	11
Scaleboard-cutters	—	1	—	1
Schools	—	3	2	5
Scum-boilers	—	—	1	1
Ships	—	3	1	4
Ship-builders	1	—	—	1
,, chandlers	—	3	—	3
Stables	—	10	8	18
Straw-bonnet makers	—	5	1	6
Tailors	—	20	13	33
Tallow chandlers, melters, and soap-boilers	—	4	4	8
Tanners	1	1	—	2
Tarpaulin-makers	—	1	—	1
Theatres	—	—	2	2
Timber merchants	—	—	1	1
Tinmen, braziers, and smiths	—	5	11	16
Toy-warehouses	—	1	1	2
Tobacconists	1	5	6	12
Varnish makers	—	—	2	2
Victuallers, licensed	3	21	29	53
Umbrella makers	—	1	—	1
Under repair, or building	4	2	9	15
Unoccupied	2	3	6	11
Upholsterers	—	2	4	6
Warehouses	—	2	2	4
Wadding makers	—	1	—	1
Waterproof-canvas makers	—	1	2	3
Water-works	—	—	1	1
Weavers	—	1	—	1
,, trimming	—	2	1	3
Wharfingers	—	—	2	2
Wine and spirit merchants	—	—	3	3
Woolstaplers	1	3	—	4
Workhouses	—	1	—	1
Workshops, not hazardous	—	1	1	2
Whiting makers	—	—	1	1
Total	32	439	644	1115

It has been objected by those who have attentively studied the subject that the existing system of fire insurance is based upon the barest "chances;" that similar "class" rates are imposed quite irrespective of the individual merits of the case; and that no abatement of premium is ever allowed for protective measures, however much they may tend to lessen the actual risk; the protective system indeed is neither attempted by the insurers nor encouraged in the insured. In April last a highly interesting paper was read before the Institute of Actuaries, "On the causes of fire in London during the twenty-four years from 1833 to 1856 inclusive, with some remarks on the deduction of correct rates of premium for fire insurances," by C. G. Fothergill, Esq., of the Westminster Fire-office. The chief purpose of this paper was said to be to ascertain, as far as possible, *the intensity of each cause of fire in each particular trade*, with a view of rendering the returns furnished by the London fire-engine establishment in some slight degree useful to fire-office surveyors and inspectors of risks, and to it are appended some remarks on the modes of calculating the appropriate rates of premium.

The author premises that his remarks are necessarily of limited value, in consequence of the indefiniteness of the data in many essential respects, and of the large proportion (amounting to 34·3 per cent. of the whole number) of fires classed as "unknown."

After giving, in a tabular form, the percentage of risks as affecting the principal trades, manufactures, and private dwellings, Mr. Fothergill proceeds to notice the numerous circumstances which affect the various risks, and the great difficulties which stand in the way of every systematic method of calculating fire premiums; he notices the improvements which have been introduced; and, alluding to what actuaries are pleased to call the *superior exactness* of the charges for life assurances, observes,—"In classifying *lives* for assurance into different ages, a year apart, we have just as many simple risks as the number of years in the duration of life, and all healthy persons of the same age are charged at the same rate for an ordinary assurance. These normal lives alone supply almost the entire business of most assurance offices, and the premiums charged thereon do not differ materially among all the offices. The analogous class of fire insurances would be for normal risks (a private house, a baker's shop; a carpenter's workshop with one bench only, &c., and all brick-built and in the safest situation), and the appropriate rates for these insurances are as well ascertained and settled as those for the ordinary life assurances just mentioned. Inquiries at twenty or thirty different fire-offices as to their charges for these risks would obtain the same quotation to a penny. But, in drawing up a list of the varieties of fire risks for the purpose of classification, with a view to apportioning correct charges for insurance, we cannot confine our attention to what may be called the normal risks as above; but we have as many different risks as the sum of *all* the combinations of *all* the different possibilities of *construction*, *situation*, *occupation*, &c., &c. In fact, we enter upon a far wider field than is presented by all the varieties of *diseased* and *foreign residence* lives. To include under the one head of carpenters (for instance) all such as practise that trade in all its gradations, will be to group together risks of more diverse hazard than those of an oilman and a butcher; for, just as the risk of a life of forty years of age, resident in England, is different from that of the same life in Cayenne, so there is a wide diversity (requiring a variation of rote) between the hazard of an insurance for a carpenter using one bench and for another with ten benches, and for another adding the use of a drying stove, &c. To find by statistical observations, therefore, the correct *average* rate for a carpenter will not suffice, since he who uses one bench *should not* and *will not* pay beyond his own risk to make up for the hazard of his fellow using ten.

Before the present century the rates charged for fire insurances were much nearer in system than at present to those now in use for life assurances. All risks were lumped into a very few rough divisions; in consequence of which, the lowest risks paid then more, and the most hazardous risks far less, than now. Indeed, a century since there were but *two* rates of premium in use, and those dependant only on the *construction* of the premises—viz., 2*s*. per cent. for brick, and 4*s*. per cent. for brick and timber buildings, and their contents; so that, in the business of one long-established office at least such extreme instances may be found as the insurance of very large sums on Drury-lane Theatre at 2*s*. per cent., being brick-built, and on the Pantheon Theatre (now occupied as a bazaar) at 4*s*. per cent., on account of its being partly timber-built; whereas the current rates for such risks, and which experience has shown to be justified, vary from two and a half to four guineas per cent. And the only deviations for a very long period from those two rates of 2*s*. and 4*s*. occurred in cases in which an office

insured a considerable amount on any one risk when a higher rate was frequently demanded on such account merely. But for many years past the fire-offices have been continually graduating their rates among the different risks, according to all the various circumstances which their experience has shown to influence the hazard of each. The steady carrying out of this plan in the practice of fire insurance, and the addition of extra charges for such of the processes or peculiarities of any trade, as their statistics have proved to be fraught with danger, have enabled the offices from time to time to modify their premiums, and, in the year 1825 particularly, to reduce the rates on the least hazardous insurances as much as 25 per cent.: * at the same time that the premiums on certain businesses, inadequately rated up to that time (among others, candle-makers, tallow-melters, cabinet-makers and carpenters, coach-makers, coopers, printers, &c.), were considerably increased.

Thus it would appear that, having due consideration to the great difficulties of systematically deducing fire-premiums from the *general* statistics of fires, the offices, instead of resisting on that ground all reform in their charges, have based their premiums on their own experience, and have succeeded in effecting important reductions from the original rates for normal insurances; while their premiums on special and extremely hazardous property are proved correct by the agreement of competing Companies, and the speedy dissolution of nearly all those offices which have from time to time been started to undersell them in any material degree. And when the Life Offices, abandoning their present rough-and-ready system of charging all moderately healthy persons of equal age the same premium, proceed to vary the rate according to the profession of the assured, his diet, his usual amusements, the conditions and neighbourhood of his residence, and the many other influences attendant on his life (all to be defined and restricted by warranties on the policy), then, and not till then, will they hold a position in which they can consistently reprove the inaccuracy of fire premiums, vaunt the superior exactness of the life tables, or show the difficulties of an improved system to have been overrated.

The numerous fires in Lambeth have afforded frequent opportunities of usefulness to the fire-brigades of Messrs. Price's Patent Candle Company and Messrs. Hodges, the distillers, whose alacrity and zeal compensate for what is wanting in experience and discipline. The engine of Messrs. Combe, Delafield, and Co., has also rendered good service in the vicinity of their extensive brewery in Seven-dials; and, in order to prevent disagreement between their servants and the Fire Brigade on the subject of the Parliamentary fire rewards, the firm liberally pay their men the rewards to which the early arrival of their engine at a fire entitles them. Messrs. Allsop, the celebrated pale ale brewers of Burton-upon-Trent, have just organised their servants into an efficient fire brigade, fully equipped, and furnished with a very excellent first-class fire-engine, built for them by Mr. Merryweather, of Long-acre, London. Numerous fires in Plymouth have afforded opportunities to Mr. Marshall, the indefatigable Agent of the West of England Insurance Company, to maintain his position as A 1, and show what individual energy can do even in competition with the town and garrison fire-engines. Mr. Richard Merryweather, Agent for the same Company at Hartlepool (although he is without a rival), loses no opportunity of adding to the fame he has already acquired.

The Leeds Fire Brigade have sustained a heavy loss during the past year in the death of their much-respected Superintendent, Mr. W. James. One Sunday night, in October last, Mr. James was called to a fire at the Patent Felt Cloth Manufactory, Camp-road, Leeds, and upon his arrival he entered one of the rooms of the building to discharge a fire-annihilator. Some of his men accompanied him for a similar purpose; after three of the fire-annihilators had been discharged Mr. James was found lying on the floor insensible. He was immediately carried into the fresh air, and medical assistance obtained, but he never became sensible, and died at eleven o'clock the following morning. The cause of his death was apoplexy. He was 56 years of age, of full habit of body, and of that character of frame which is generally supposed to indicate a strong liability to the disease to which his death is attributed. Mr. James was a self-educated man, with strong powers of mind, devoid of prejudice. In the *fire-annihilator*, when properly applied, he saw a valuable agent, the successful application of which at numerous fires has obtained both himself and that invention very great celebrity.

The two following recent applications of the fire-annihilator are deserving of notice,

* It should be observed that this reduction was forced upon the older offices by the starting of several new ones, whose claim to public patronage was grounded upon the important reductions they offered on non-hazardous risks.—W. B.

applying, as one of them does, to the circumstances attending a very large proportion of Metropolitan fires, and the other to a less frequent, but far more troublesome class of fires, viz., those which occur in vaults and cellars, almost always difficult of access.

A fire broke out in a hair-dresser's and perfumer's premises, in a large way of business at Bath. The whole of the front and back shops were on fire, and the flames rushing up the stair-case; a hole was cut in one of the front shutters, and three *annihilators* discharged, which had the effect of extinguishing the fire instantaneously, a very small quantity of water being used to extinguish a few embers. The engineer of the Bath water-works (A. Mitchell, Esq.) says, "I have not the last doubt that if the *annihilators* * had not been used, the house would have been burnt to the ground!"

At a fire, which broke out in the basement of the premises of Mr. Perry, oilman and druggist, High-street, Gravesend, a very serious conflagration was nipped in the bud, solely by the prompt application of the fire-annihilators. On the arrival of Mr. Superintendent White, dense volumes of smoke were ascending from the front-cellar flap, which he covered over with mats. He then entered the shop and opened the doors leading to the cellars, in which were deposited a very large stock of oils, naphtha, turpentine, and other inflammable matters! The ascending heat and smoke were overpowering, to reduce which a No. 3 Annihilator was discharged down the stairs. Superintendent White then proceeded to the back of the house and opened the cellar-flap, when the flames began to increase rapidly; a second No. 3 machine was discharged into the cellar, which immediately extinguished all flame, and so reduced the heat as to enable the cellar to be entered, and a few buckets of water made all safe. From the character and quantity of combustibles in the cellar, it was certain that but for the annihilators an alarming conflagration would have taken place, as no water could possibly have been directed upon the seat of the fire!

Happily the metropolis was not the scene of many "great fires" last year; among the more serious I may note the following:—

Monday, March 3d, 8¾ p.m., a fire took place in the premises of Mr. Watkinson, upholsterer, &c., 227, Strand, near Temple-bar, which called for extraordinary exertions on the part of the firemen, and was not extinguished until the warerooms behind with a valuable stock of furniture were entirely destroyed, the front house severely damaged, as were several houses in Palsgrave-place and Thanet-place. The origin of the fire was supposed not to be accidental.

Tuesday, June 9th, 10½ p.m., a tremendous conflagration broke out in the goods, station of Messrs. Pickford and Co., carriers, London and North-western Railway station-Camden-town, which, for its intensity, illuminating power, and destruction of property, greatly surpassed any metropolitan fire of modern date. The fire broke out suddenly and spread so rapidly, that by the time the Brigade engines arrived the entire range of warehouses and store-rooms, containing 250 square feet, were one mass of flames. Numerous engines, with a powerful body of firemen and auxiliaries, were soon collected; but the supply of water was wholly inadequate to the requirements of the occasion, barely sufficient, in fact, to save the threatened adjacent buildings, and the main body of fire burned itself out, no impression being made upon it. The extensive premises of Messrs. Collard and Co., pianoforte-makers, Messrs. Taylor's, flour-mills, and the Stanhope Tavern, were damaged, and narrowly escaped destruction.

Saturday, July 18th, 11½ p.m., a fire of a most destructive character broke out in the extensive premises of Mr. Wilson, builder and steam saw-mills, Great Suffolk-street, Borough. The firemen were promptly in attendance, and the utmost exertions were made to arrest the progress of the flames, but, before this could be accomplished, the saw-mills and workshops, 170 feet long by 25 feet wide, were all but destroyed, and the lage stock of timber in the yard very seriously damaged; fifteen of the surrounding buildings were also damaged.

Friday, August 28th, 12½ p.m., a fire broke out in the extensive premises of Mr. Dunbar, shipwright, Orchard-house-yard, Blackwall, which ended in the total destruction of the workshops, mast-houses, block-maker's factory, and sail lofts, and severely damaged the stock in open yard.

Monday, September 7th, 11 p.m., a fire broke out in Bowles' Wharf, Ratcliff, in the occupation of Mr. Raven, hay salesman, which destroyed the whole of the premises, with about 130 loads of hay and clover, 7 carts, and 3 horses. The adjoining premises of Messrs. Saunders and Cameron (bottled beer and ale merchants), of Mr. Bower, shipping clerk), Messrs. Southe (sail-makers), Mrs. Armstrong (china-dealer), and the Branch Coal-meters-office, were also seriously damaged. The two steam floating fire-engines

* Which had been provided by the Times Insurance Company.

were in attendance, and rendered most efficient service in staying the progress of the conflagration.

Tuesday, December 8th, 6 p.m., during the prevalence of a dense fog, a fire broke out in a large unfinished house, in the Upper Cottenham-road, Hornsey-road, which burnt itself out unmolested, no fireman, police, or turncock being present, and the conflagration was only seen by two persons.

13, Angel-terrace, Islington,
February 3, 1858.

[*Errata in our last number.*—Page 171, first column, fourth line from bottom of page, *for* "ruins," *read* "runs." Page 172, eighteenth line from top, *for* "Vermor," *read* "Fermor." Page 176, first column, sixteenth line from bottom, *for* "Foxman," *read* "Fixman."]

ON MOLECULAR IMPRESSIONS BY LIGHT AND ELECTRICITY.

(*Concluded from p.* 178.)

Passing now to the effects of electricity, every day brings us fresh evidence of the molecular changes effected by this agent. The electric discharge alters the constitution of many gases across which it is passed; and it was shown, that by passing it through an attenuated atmosphere of the vapours of phosphorus, this element is changed by the electric discharge into its allotropic variety, which is deposited in notable quantity on the sides of the receiver. In this experiment, the transverse bands or striæ discovered by Mr. Grove, in 1852, are very strikingly shown. Not only is the gaseous intermedium thus affected, but the terminals from which the discharge appears to issue, are disintegrated, and their molecules projected. Some tubes, through the interior of which Mr. Gassiot had passed the discharge from Ruhmkorff's coil for a considerable time, were shown to be coated in the interior, for a notable space around the negative terminal, with a deposit of platinum, forming a reflecting surface like the back of a looking-glass. The vacuum in these tubes was Torricellian, the tubes having been hermetically sealed after the descent of the mercury, so as to cut them off from the mercurial surface. In these cases the electric discharge passes from metal to metal; but the glow which is seen on excited electrics, such as glass, was also shown by Mr. Grove to be accompanied with molecular change. Letters cut in paper, and placed between two well-cleaned sheets of glass, formed into a Leyden apparatus by sheets of tin foil on their outer surfaces, and then electrified by connexion for a few seconds with a Ruhmkorff coil, had invisible images of the letters impressed upon the interior surfaces, which were rendered visible by breathing on them; and rendered visible, and at the same time permanently etched, by exposure, after electrization, to the vapour of hydrofluoric acid.

So, again, if iodized collodion be poured over the surface of glass having the invisible image, and then treated as for a photograph, and exposed to uniform daylight, the invisible image is ultimately developed in the collodion film; the invisible molecular change having been conveyed to the collodion, and rendering it, when nitrated, more sensitive to light in the parts where it has been in proximity to the electrical impression, than in the residual parts. Here we have a molecular change, produced first by electricity on the glass, then communicated by the glass to the collodion, then changed in character by light, and all this time invisible; and then rendered visible by pyrogallic acid, the developing chemical agent. Test papers between the plates of glass so electrized, show an acid, and also a bleaching reaction, probably due to the formation of nitrous acid and of ozone; and thus evidencing a chemical change in the elastic intermedium, as well as in the bounding surfaces: but the interior molecules of the glass appear also to partake of the effect, as the impressions are reproduced in many cases on the opposite surface of the glass.

Mr. Babbage had observed that some plates of glass which had formed the ornamented margin of an old looking-glass, and were backed by a design in gold leaf covered with plaster of Paris, showed, when this backing was removed by soft soap, an impression of the gold-leaf device, which was rendered visible by the breath on the glass. Some of the plates had been kindly lent by him for this evening; and in one Mr. Grove had removed a portion of the backing, and the continuation of the gilded design came beautifully out by breathing on the glass while in the frame of the electric lamp, and was projected (as were the previous electrical images) on a white screen. The effect on Mr. Babbage's plates may be also electrical, arising from the gold—a good conductor—acting as platinum does in the voltaic battery, and setting up a chemical action between the substance used for making the gold adhere and the glass, or between the constituents of the glass itself; but it would be hazardous, without further experiment, to express any confident opinion on this point.

Of the practical results to science of the molecular changes forming the subject of this evening's discourse, a beautiful illustration was afforded by the photographs of the moon by Mr. Warren de la Rue which

gave, by the aid of the electric lamp, images of the moon of six feet diameter, in which the details of the moon's surface were well defined—the cone in Tycho, the double cone in Copernicus, and even the ridge of Aristarchus, could be detected. The bright lines, radiating from the mountains, were clear and distinct. A photograph of the planet Jupiter was also shown, in which the belts were very well marked, and the satellites visible. The following question was suggested by Mr. Grove:—As telescopic power is known to be limited by the area of the speculum or object-glass, even assuming perfect definition, as the light decreases inversely as the square of the magnifying power, a limit must be reached at which the minute details of an object become lost for want of light. Now, assuming a high degree of perfection in astronomical photographs, these may be illuminated to an indefinite degree of brilliancy by adventitious light. With a given telescope, could a better effect be obtained by illuminating the photographic image, and applying microscopic power to that, than by magnifying the luminous image in the usual way by the eye-glass of the telescope? Can the addition of extraneous light to the photograph permit a higher magnifying power to be used with effect than that which can be used to look at the image which makes the photographic impression? In other words, is the photographic eye more sensitive than the living eye; or can a photographic recipient be found which will register impressions which the living eye does not detect, but which, by increased light or by developing agents, may be rendered visible to the living eye? Much may be said, *pro* and *con*, on this question, and it probably can only be satisfactorily answered by experiments, when photographic science is sufficiently advanced.

The phenomena treated of this evening, which are a mere selection from a crowd of analogous effects, show that light and electricity, in numerous cases, produce a molecular change in ponderable matter affected by them. The modifications of the supposed imponderables themselves have long been the subjects of investigation; the recent progress of science teaches us to look for the reciprocal effects on the matter affected by them.

Gases which have transmitted *light* are altered; as, for example, chlorine is rendered capable of combining directly with hydrogen; liquids are altered, peroxalate of iron is chemically changed, and gives off carbonic acid; and the light which has produced these effects is less able to produce them a second time. Solids are altered, as shown in the extensive range of photographic effects. So with *electricity*—compound gases are changed chemically, as ammonia or atmospheric air; elementary gases are changed allotropically, as phosphorus vapour, or oxygen; liquids are changed, as in the decomposition of water and other electrolytes; and solids are changed, as in the projection of the particles of the terminals, and the impressions on the surfaces of electrics, shown this evening. Few, indeed, if any, electrical effects, have not been proved to be accompanied with molecular changes; and we are daily receiving additions to those produced by light. So, again, iron, and other bodies have their molecular structure changed by magnetism. Chemical affinity is universally, and heat generally, admitted to be an affection of ordinary matter. Mr. Grove feels deeply convinced that a dynamic theory, one which regards the imponderables as forces acting upon ordinary matter in different states of density, or as modes of motion, and not as fluids or entities, is the truest conception which the mind can form of these agents; but to those who are not willing to go so far, the ever increasing number of instances of such molecular changes affords a boundless field of promise for future investigation, for new physical discoveries and new practical applications.

The permanency of such changes also gives valuable means of reading, in the present state of matter, its past history; final or absolute knowledge on such subjects we cannot hope to obtain, but relative or approximate knowledge is as unlimited as is the degree of improvement in the powers attainable for its acquisition.

THE IRON TRADE.

FROM OUR OWN CORRESPONDENT AT WOLVERHAMPTON.

The Board of Trade Returns—Decrease upon the Month—Increase upon the Year—Remarks—South Staffordshire—The Failures and the Wages—Coal and Colliers — Improvements in the Iron Trade—Reports from the Principal Districts.

It is gratifying to observe that, notwithstanding the recent large diminution in the make and consequent export of iron, the Board of Trade returns for 1857 show an increase in favour of 1857 as compared with the previous year. This will be seen by a reference to the following comparative statements of the iron exported in 1856 and 1857 respectively, with that also exported in the last month of each year, in which shorter period the returns show a serious diminution. In the annexed extract from the Board

of Trade returns we have included the value of the machinery, and also the coal and culm, exported in December, 1856 and 1857, and in the twelve months of those two years respectively:—

	Month ending Dec. 31. 1856.	Month ending Dec. 31. 1857.	Year 1856.	Year 1857.
Iron—pig	73,959	56,890	1,385,118	1,611,467
" bar, bolt, & rod	413,239	332,554	6,217,524	6,257,065
" wire..........	13,306	12,849	195,034	243,309
" cast..........	32,541	51,290	712,177	754,618
" wrought of all sorts ...	228,173	211,617	3,720,433	3,979,398
Machinery—steam engines	42,251	112,261	819,067	1,062,286
Ditto, other sorts...	153,308	152,695	1,897,386	2,820,737
Coals and culm ...	168,717	186,121	2,826,582	3,200,551

With respect to the countries to which the great decrease in the month is chiefly due, the United States, as may have been expected, shows the most remarkable decrease. The falling off in the consumption of metals was enormous, the exports to the United States being, for December, 1856 and 1857, as follows:—Pig iron, 11,166*l.*, 6,012*l.*; bar, bolt, and rod, 141,172*l.*, 19,889*l.*; wrought iron, 30,065*l.*, 3,209*l.*; steel, 34,578*l.*, 5,875*l.*; copper sheets, 19,683*l.*, 1,493*l.*; tin plates, 75,149*l.*, 6,870*l.* Cast iron is an exception to the rule, and shows a considerable increase.

In the exports for the year the only increase of a remarkable character is in steam-engines and other machinery. The countries to which steam-engines were exported are as follows, the extent of their consumption being in the order in which their names stand:—Spain, East Indies, Australia, Russia, France, Sardinia, Denmark, and British North America, but minor countries, not particularly named, took more than half the quantity. Other machinery was exported chiefly to Russia, East Indies, France, Hanse Towns, Holland, Spain, and Australia, but in this case also minor countries took nearly half the whole amount of machinery exported.

South Staffordshire has been chiefly occupied in the past month in the arranging of the matters incident to the insolvency or bankruptcy of a large number of firms engaged in the iron and coal trades, whose insolvency the recent money panic has made patent. Before these have been fully arranged some few months will yet elapse.

On the whole it is thought that although a small percentage will be attainable, yet that the estates will yield more than was at first expected.

After this the labour question has most interested the makers of iron and the getters of coal.

The puddlers, after a fortnight's resistance, have all "gone in" at the drop.

Coal has been reduced 1*s.* per ton on both the east and west sides of Dudley, and colliers' wages have been reduced in proportion.

The iron trade displays slight signs of improvement. Two blast furnaces that have been "out" since the commencement of the panic have been blown in, and as many others are immediately to follow.

The reports from Yorkshire, Derbyshire, and Lancashire indicate progress, although slow.

From Northumberland and Durham the reports still speak of extreme dulness.

Monmouthshire and South Wales, with North Wales, also are improving—the latter in particular. The improvement in Wales is due chiefly to an improved demand for rails.

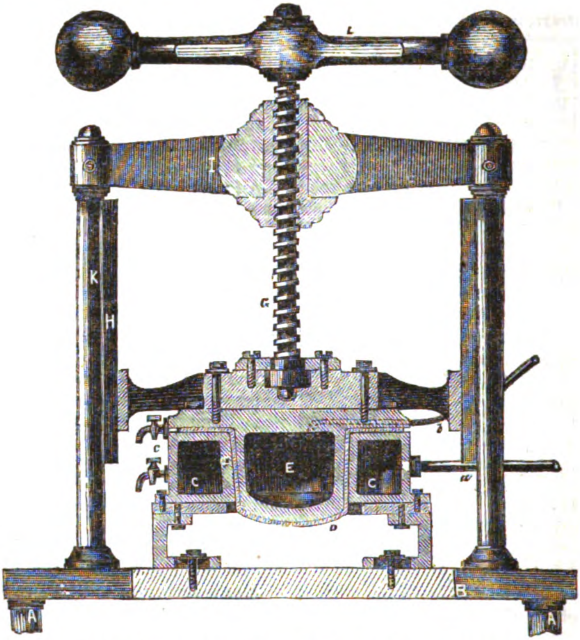
The malleable iron makers in South Staffordshire who have anything to do now worthy of note are those whose names are high in the market. These are engaged chiefly in the manufacture of plates for girder bridges and similar engineering work.

HARDING'S PATENT METHOD OF MANUFACTURING HATS AND BONNETS.

MR. GUSTAVUS P. HARDING, Manufacturer, of Jewin-street, London, has recently introduced a patent method of manufacturing hats, bonnets, wide-awakes, and other coverings for the head in cloth, velvet, plush, and other similar materials, after having been dressed with a solution of some adhesive material, by stamping the same into form between a heated mould and heated plunger or die, the edges of the cloth or fabric being held in a state of tension to prevent the formation of puckers while the die is being forced into the mould. He is thus enabled to form a hat from one piece of fabric without any joining, and which only requires trimming to be ready for wear.

In bonnets he is enabled to dispense with the bodies or milliner's shapes now required. Where requisite a lining may be stamped up with the cloth at the same operation.

The annexed engraving is a sectional elevation of such a press as he finds convenient for carrying his invention into effect.



A A are legs supporting a table, B; C is a metal form made hollow and secured to the table. This form is shaped at D as a mould, according to the pattern or shape of the bonnet, or other article to be produced:—*a* is a pipe for conveying steam or hot air into the interior of the form for keeping it heated; E is a hollow metal plunger, into which steam or other heating medium is admitted through the flexible pipe, *b*, or otherwise; *c c* are taps for letting off any surplus steam. The plunger is bolted to a plate, F, affixed to the bottom of a threaded shaft, G. H H are two guides. I is a cross-head, supported by the uprights, K K. The threaded shaft works through a nut in the cross-head, and is driven by the hand lever, L.

When desirable a waterproof solution or composition may be applied to dress the fabric or material from which the bonnet or other article is to be formed, or it may be used to cause adhesion between the lining and the body when a lining is employed. Hats, caps, bonnets, and other coverings for the head, produced in the manner last described, will be waterproof. It will be readily understood that any pattern or device capable of being produced by stamping may be applied to the article to be formed, by engraving or otherwise preparing the matrix and plunger to produce the effect required.

ANOTHER GREAT EXHIBITION.

The thought of another Universal Exhibition (scene, London; time, 1861) is received into favour. Three or four months ago we revived the hope, everywhere felt at the close of the first brilliant season of the Crystal Palace, that the glories, pleasures, and amenities of 1851 might be renewed in 1861. We rejoice to hear that schemes to this end are now a-foot, and that a proposal on the subject lies before the Society of Arts. These schemes contemplate an exhibition of fine art. We ourselves shall prefer to find the scheme take larger proportions. Why not an Exhibition of Industrial Art—of every article fashioned by man's fingers from the Transfiguration to a tin kettle? A gathering of the nations should be held around objects which interest millions. For Grosvenor-square let there be Raphael and Titian,

Phidias, Michael Angelo, and Cellini. For Regent-street and Cheapside let us show satins, hangings, shawls, ribbons, musical instruments, engravings. For Lambeth and Whitechapel let us have photographs, Dutch clocks, wall papers, coloured prints, and crockery. Everything that is useful, and that may be rendered beautiful, should find a place in the Palace of 1861. The good done to public taste by the first Crystal Palace is incalculable. We see it, not merely in Academics, Institutions, and Schools of Design, but in the dress of the weaver, the decoration of the artizan's home, and in the shelves of kitchen-maids. Let us walk perseveringly in this path: the public will assuredly support us.—*Athenæum.*

ORDNANCE IMPROVEMENTS.

[The following letter from Captain Jervis reached us too late for insertion in our last number.]

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I have just seen a letter in your Magazine of the 30th ult. signed "Observer," where my name appears more frequently than honourably. Though not in the habit of replying to anonymous correspondents, yet, as your Magazine is so largely circulated amongst the more enlightened men of this country, I would beg to state that I am no more attached to the Ordnance Committee at Enfield than to the Select Committee at Woolwich. Further, I consider that it is inexpedient for officers who belong to the manufacturing departments to sit as members of permanent Ordnance Committees, as it is evident that those gentlemen have not time to pay attention to the numerous proposals brought before them, and that man is besides naturally biassed, more or less, in favour of a system of manufacturing which he may have brought to great perfection. The War Department referring to them as to the probable cost of changes in manufacture, is another question.

As to whether I do or do not duly weigh the question of expenditure in connexion with that of improvement, is a matter on which "Observer," from the tenour of his remarks is evidently unable to judge. My opinion is, that no radical change should take place by the introduction of a new weapon into the service, which must naturally entail great expenditure, unless the advantages conferred are distinct and conclusive; but whether trials, duly recommended, should be made on a limited scale is a point upon which sensible men do not differ.

I remain your obedient servant,

H. J. W. JERVIS, Capt. R.N.

Enfield Lock, Feb. 15, 1858.

THE MOON'S ATMOSPHERE.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—As friendly disputation leads to knowledge, I trouble you with a reply to the objections of "J. T."

Nothing was said about ether. What *is* ether?

That the air is "subject to the attraction denominated gravitation" is in no wise hostile to the atmosphere's "extending itself to unlimited distances" when the diminution of the attraction is also unlimited. "Unlimited" only means that no limit is assigned.

It was never argued that all planets would have atmospheres "and of the same rarity;" but, on the contrary, that they would have atmospheres with densities dependent on their attractive powers and in some degree on their radii.

No argument was founded upon *supposition;* but an attempt, whether successful or not, was made to prove the existence of a principle on which, if true, the planets must necessarily have atmospheres.

No mention was made of a "uniform fluid," but, on the contrary, of a fluid which was nowhere uniform, except at equal distances from an attracting body.

That "Jupiter and others of the planets have no atmospheres," must be understood to mean that certain experiments relied on, connected with refraction, have not ended in demonstrating atmospheres. But both experiments and inferences from them are often corrected on further knowledge. For example, it was confidently affirmed that the moon had no atmosphere because there were no signs of clouds; but cause was shown in my former why the moon might have an atmosphere not able to sustain clouds. Many an accepted belief has been corrected on inquiry; and if one has, another may. At all events, inquiry must be open.

Yours very sincerely,

T. PERRONET THOMPSON.

Eliot-vale, Blackheath, Feb. 22, 1858.

THE WAVE-LINE SYSTEM.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Has Mr. Moy a treacherous memory and a dull apprehension, or is . 's letter in your last number the result of dexterity and suppressed candour? I should not feel justified in imputing to him any mental defect whatever. Then, how is it that he is so oblivious with regard to the "centre of effort"—that he quotes *part* of a paragraph, the *whole* of which I quoted and commented upon,—that he imagines I "considered a ship to be driven out of her course by what is termed lee-way in a greater degree with the wind on her quarter than in any other point of sailing"? I will venture to say that not one of your readers besides Mr. Moy inferred from my remarks that I entertained such a silly notion. I studiously put all my points in opposition to his views as fairly and favourably to him as I could, and the result, alas! is, that I am the victim of my own generosity. But I deprecate any approach to altercation upon this subject. Those of your readers who feel sufficient interest in it will turn back, read, and judge for themselves.

I sincerely regret that I have no hope of obtaining for Mr. Moy the tracings for which he asks. The water-line at a given angle of deflection is out of the question. But if I can obtain the ordinary water lines or horizontal sections, it will afford me great pleasure to send them to his address.

I believe the hollow bow has been filled out, and we may, perhaps, by-and-bye learn the result. Mr. Moy forgets that modern cut-waters are kept very high. They have been found to do mischief.

I am, Gentlemen,
Your obedient servant,
NAUTICUS.

ELECTRIC TELEGRAPH BELLS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I shall be glad if any of your readers will tell me where I can procure, and what will be the price of, a *working* model of the bell which is used by the Electric Telegraph Company to call the attention of the clerk to the needle at that time being worked.

By so doing they will oblige your correspondent, WALSH.

Cheltenham, Feb. 21, 1858.

THE ÆOLIPHON.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—In answer to your question, I beg to say that I am not aware that the above name has been applied to anything else. You are probably thinking of the "Æolipile," a reaction steam-engine of very old date.

I am, Gentlemen, yours, &c.,
J. A. D.

February 16, 1858.

[We alluded not to the "Æolipile," but to the "Æolophon," an instrument which has been in use for many years. The only maker of it known to us was a Mr. John F. Myers, of Charlotte-street, Fitzroy-square, London. A specimen of the instrument may be seen at Salem (Wesleyan) Chapel, Sheerness, where it is employed to lead the congregational singing. It is a sweet, melodious, and powerful instrument.—EDS. M. M.]

SPECIFICATIONS OF PATENTS RECENTLY FILED.

JOPLING, T. T. *Improvements in water gauges of steam-boilers.* Dated May 27, 1857. (No. 1507.)

This invention was described and illustrated at p. 560, of No. 1766, Vol. lxvi.

GRIFFITHS, E. P. *Improvements in apparatus for beating the whites of eggs and other fluids and matters.* Dated May 27, 1857. (No. 1508.)

A moveable frame is placed on the upper part of a saucepan or other vessel. This frame carries an axis with a crank handle, which give motion by gearing to two frames, within the vessel, in opposite directions. The frames have projections, which in their rotation pass between each other.

HODGES, R. E. *Improvements in gauges and scales.* Dated May 27, 1857. (No. 1509.)

These consist of triangles graduated on their bases, and with lines at right angles to the bases drawn to the opposite sides of the triangles. Two similar triangles of this description are used at one time, and if it is required to gauge the size of a hole the apices of the two are projected through it from opposite sides, and the distance which the triangles lap is read off on the scales, and gives the internal diameter of the hole.

HALE, W. *Improvements in rolling iron and steel.* Dated May 27, 1857. (No. 1510.)

The axes of each pair of the rollers used

are at an angle to each other, and the axes of succeeding pairs of rollers are in opposite directions. By these means the grain of the iron and steel rolled will be twisted, crossed, and coiled, and when it is desired to cross the fibres of iron or steel when worked into flat bars, it is preferred to use a pair of rollers with parallel axes, one moving at a greater surface speed than the other, and these rollers have two others working with like surface speed, intermediate of the speeds of the two first rollers.

NEWTON, W. E. *An improved method of applying photography to the use of engravers.* (A communication.) Dated May 27, 1857. (No. 1511.)

This relates to producing photographic pictures upon wooden blocks to be engraved, and consists in producing a surface upon the block by rubbing into it a volatile varnish made so limpid as easily to soak into and fill the pores of the wood, and produce a smooth and polished surface. The varnish is made of asphaltum varnish, ether, and lamp black.

NEWTON, A. V. *Certain improved apparatus to be used in the manufacture of iron.* (A communication.) Dated May 27, 1857. (No. 1512.)

This relates to puddling by means of an instrument which passes through the roof of the furnace, and is actuated by steam-power. The operation is regulated by mechanism outside the furnace, and the instrument is protected against the heat by a current of air or water circulating through it.

HART, T. *Improvements in the manufacture of lamp-glasses, applicable to railway carriage and other lamps.* Dated May 27, 1857. (No. 1513.)

The object here is to construct lamp-glasses that will concentrate the light and throw the concentrated rays where required. It is particularly applicable to railway carriage lamps. The patentee constructs the glass of a lenticular form, so that the rays, in passing through the glass, may be refracted and concentrated.

COX, N. *Improvements in railways.* (A communication.) Dated May 28, 1857. (No. 1514.)

Two side rails or trams are laid down, on or in which the wheels of the carriages run. A central corrugated rail is laid between the others. The driving wheels of the engine run upon this central rail, and thus obtain great adhesion. This central rail may be employed on steep inclines.

SIMPSON, A. *A new or improved slop and toilet pail.* (A communication.) Dated May 27, 1857. (No. 1515.)

This is designed to render the slop and toilet pails available as chamber commodes, as well as for the purposes for which they are usually employed. The interior of the pails is fitted with a pan of earthenware, or coated with similar non-absorbent material, and provided with an air-tight lid secured by a bayonet-joint fastening.

WILBER, W. *Hot air apparatus for hulling and extracting oils from oleaginous seeds.* Dated May 29, 1857. (No. 1516.)

This consists in a new construction of pressing rollers, and an arrangement of chambers and tubes in connexion with a fan for effecting the circulation of hot air through various parts of the machinery, and in its direct application to the seeds and pulp.

WILLIS, T., and G. CHELL. *Improvements in machinery for spinning, doubling, and winding yarn and thread.* Dated May 29, 1857. (No. 1517.)

This consists,—1. In driving the vertical spindles of winding machines by friction and gravitation or toothed wheels, instead of by bands. 2. In certain self-acting motions applicable to machines for spinning, doubling, and winding, for stopping the spindle or pin bobbin, or both, when the yarn or thread breaks, or ceases to be supplied. 3. In machinery for delivering the yarn or thread to the bobbin in the proportion required by the conical shape of the bobbin, this machinery also serving to regulate the drag of the yarn or thread, and to free it from the hank or skein. 4. In varying the speed of the spindles and bobbins to compensate for the different diameters of the conical part of the bobbins by giving a lateral to and fro motion to the shaft with the friction discs by which the spindles are driven.

FLEET, C. *An improvement or improvements in the manufacture of printing ink.* (A communication.) Dated May 29, 1857. (No. 1518.)

The material employed here is the calcined green oxide of chromium, which is mixed with oil or vanish or the other ordinary ingredients of printing ink.

MERRYLEES, J. *Improvements in the manufacture or production of ornamental fabrics.* Dated May 29, 1857. (No. 1520.)

This relates to the maufacture of woven fabrics with patterns on both sides, and it consists in certain preparations or arrangements of designs, cards, &c., whereby three or four plies of cloth may be woven simultaneously, each of the plies either consisting simply of a warp and ground weft, or having spotting weft or wefts in addition; and the various plies are so intermixed in the weaving as that, wherever any one is exposed on one side of the fabric either one

or other of the remaining plies is exposed at the corresponding part of the other side.

MERRYLEES, J. *Improvements in the manufacture or production of carpets and other ornamental fabrics.* Dated May 29, 1857. (No. 1521.)

Claims, 1st, the system of weaving three ply fabrics, whereby different patterns can be simultaneously produced on both sides, through the united operation of two compartments of perforated card surface upon two compartments or sets of double-eyed needles, which regulate the action of four combs or draught boards upon one double and two single harnesses, so as to operate on three different warps in proper rotation; 2d, the system, in connexion with the arrangement described, of raising in proper succession by the jacquard machinery the journals or apparatus by which the three plies are woven into cloth independently of the needles and perforated card surfaces which are required for the production of the said patterns, and the concentration thereby upon the action of a single lever or treadle of the motion or propulsion of the whole machinery for governing the harnesses and journals, in order to obtain great facility in the weaving.

FONTAINEMOREAU, P. A. L. DE. *Improvements in the construction of smoke-consuming furnaces, applicable to boilers.* (A communication.) Dated May 29, 1857. (No. 1522.)

These consist in constructing furnaces with a peculiar arrangement of valves, levers, and flues or pipes, to cause the smoke to return to the furnace to be consumed.

CLARK, W. S. *Improvements in machinery for the manufacture of an instrument for sharpening watch-cleaning sticks used by watchmakers, said instrument being also applicable to the sharpening of small wooden cylinders for other purposes, such as lead pencils, &c.* (A communication.) Dated May 30, 1857. (No. 1524.)

This consists in providing, by a combination of parts, for holding the cutting blade in such a manner within the mould as to secure it there by the metal composition when poured into the mould; the mould is constructed in any of the known forms.

ALEXANDRE, E. *Improvements in the manufacture of organs and other similar musical instruments.* Dated May 30, 1857. (No. 1526.)

This consists—1. In applying to portable organs cases or bellows governed by pedals or by straps actuated by the knees. This produces distant effects, and gives a greater duration to the sounds if desired. 2. In employing a valve for every vibrating reed, whereby every key commands as many valves as there are stops in the instrument. 3. In substituting metallic for wooden cases for the sake of durability.

CLARK, M., H. OLDFIELD, and W. SALMON. *Improvements in machinery or apparatus used in the manufacture of paper.* Dated May 30, 1857. (No. 1527.)

This relates to the exhaust or suction box over which the wire cloth containing the pulp passes during the manufacture, and consists in the suction box being furnished with rollers to reduce the friction, or in the said box being formed of three rollers alone, over which the wire cloth passes.

BLEIBTREU, H. *A new mode of preparing coke for metallurgical processes.* Dated May 30, 1857. (No. 1528.)

Small crushed coal is mixed with powdered lime stone, chalk, burnt lime, or other calcareous substances. This compound is mixed with the coal to be converted into coke. It is then converted into coke in the ordinary way.

JAMES, J., and W. D. GRIMSHAW. *An improved screw propeller for propelling ships or other navigable vessels through water.* Dated May 30, 1857. (No. 1530.)

This consists in combining a hydrostatic apparatus worked on the principle of the "turbine," with a reaction screw propeller for propelling ships. The propeller consists of hollow blades, through which water is forced.

WARLICH, F. C. *Improvements in generating steam.* Dated May 30, 1857. (No. 1533.)

Under one modification of this invention the patentee employs a series of tubes set in a furnace, as gas retorts are set, and inside these are smaller tubes perforated with fine holes. The water is forced into these smaller tubes by force pumps, so that it issues in very fine streams, which strike against sheet iron shields placed over the small tubes, and break up into a fine mist, which is immediately converted into steam, and the steam passes out of the large tubes into a chamber heated by a furnace, in which it becomes superheated. This process may be modified.

HORNSEY, G. *Improved apparatus for the engine-rooms of steam-vessels for communicating signals and orders from the captain on deck to the engineer or attendant below.* Dated May 30, 1857. (No. 1535.)

The apparatus consists of a dial, which has marked on its face words of command, such as "stop," "go on," "back," &c. This dial is mounted on a shaft which may be rotated so as to bring any particular word opposite an opening in the face-plate

of the apparatus. To attract the attention of the engineer a bell is connected therewith.

ALEXANDRE, L. P. L., and L. P. F. MALLET. *Improvements in machinery for propelling vessels.* Dated June 1, 1857. (No. 1538.)

The patentees employ a system of submerged paddles under the vessel, sliding longitudinally between guides. An alternate reciprocating motion is imparted to them by a direct-acting engine. Each paddle is capable of making one-quarter of a revolution upon its own axis, so as to assume a vertical position when pushing, and a horizontal position when returning.

FELLOWS, F. P. *Improvements in the manufacture of hinges, cocks, and other jointed articles, of which one part is required to be capable of turning upon or in another part of the same article.* Dated June 1, 1857. (No. 1539.)

This invention cannot be described without engravings.

WALENN, W. H. *Improvements in the electric deposition of metals and metallic alloys.* Dated June 1, 1857. (No. 1540.)

This relates to the solution used for such deposition. The patentee claims the application of the tartrate of ammonium and cyanide of potassium in combination.

SALMON, J. A. *Improvements in steam-engines and in apparatus for feeding boilers, and in furnaces.* Dated June 1, 1857. (No. 1541.)

These improvements in steam-engines consist in working a double-acting air-pump by, or partially by, the exhaust steam, the exit of which is checked by a perforated plate in the exhaust pipe. The piston of the air-pump is packed by eccentric metallic rings; also in placing friction rollers on the bearings of the crank-shaft. The improvements in feed apparatus comprise arrangements which require engravings to illustrate them. The improvements in furnaces comprise an arrangement of air chambers, &c., with perforated and inclined plates.

BEQUEMIE, L. L. *Improvements in cocks.* (A communication.) Dated June 1, 1857. (No. 1542.)

This consists in certain modes of opening and closing the egress opening of cocks, by means of a disc acted upon by a spring.

TINGLE, G. *An improvement or improvements in machinery for the manufacture of articles from clay and other plastic substances.* Dated June 1, 1857. (No. 1543.)

This refers to the manufacture of articles resembling a hollow cylinder closed at one end, and consists in the use of a valve in the plunger by which the interior of articles made of clay, &c., is fastened, the valve opening on the rising of the plunger, thereby admitting air beneath the plunger and permitting of the ready removal of the plunger from the said articles.

BENTLEY, N., and J. ALCOCK. *Improvements in machinery or apparatus for forging and stamping metals, which is also applicable to pile-driving, crushing ores and seeds, beetling and fulling woven fabrics and other similar purposes.* Dated June 2, 1857. (No. 1553.)

On a vertical sliding bar the patentees fix a stud or pivot, with or without an anti-friction pulley, which, being acted upon by an intermittent spiral cam placed upon a vertical shaft, causes the hammer, &c., to rise and fall at any required distance.

STEVENS, J. *Improvements in water gas meters.* Dated June 2, 1857. (No. 1555.)

The patentee applies a float in each meter, so that, if the meter be tilted, the float and apparatus connected therewith act on an inlet valve, so as to reduce and shut off the supply of gas to the meter, and also act on a valve to close the hydraulic or water tube, so as to prevent the water being drawn off; and the apparatus is also arranged so as to regulate the supply of gas to the burners.

ROY, E. *Improvements in the construction of railway vehicles for the special purpose of allowing them to run freely on short curved lines.* Dated June 3, 1857. (No. 1559.)

This consists, 1st, in fixing the axle bearings in their boxes so that they can slide in an oblique direction whenever the wheels are running on curved lines, through the action exerted on the flanges of the wheels by the rails, which action brings the axles always at right angles with the line of rails. 2d, in attaching the wagons together by applying a single connecting buffing block in the middle.

JONES, W. *Improvements in heating and compressing artificial fuel.* Dated June 3, 1857. (No. 1562.)

The mixed materials are fed on to an endless platform, which passes into an oven, by which the materials become heated and the pitch melted. They next fall into a hopper, under which revolve two wheels, with moulds at intervals, which become filled with the materials. The recesses or moulds of one wheel come opposite spaces between the moulds of the other wheel, and on such spaces are formed projections which enter into and compress the fuel in the moulds. Each mould is made with a moveable bottom, to the back of which is a rod passing out through the back of the

mould; and, as the wheels revolve, these rods are acted upon by suitable projecting surfaces, so as to cause the false bottoms to be moved outwards, whilst the outer surfaces of the fuel in the moulds are being compressed by the projections. The false bottoms afterwards force the moulded masses on to an endless travelling chain by which the blocks are conveyed away.

JOBSON, J. *Improvements in oil cans or feeders.* Dated June 3, 1857. (No. 1567.)

The object here is the regulation and limiting of the supply of oil allowed to flow when oiling bearings of machinery, &c., and whereby waste is prevented, and the invention mainly consists in the use of a piston in the spout, which piston is worked by a finger of the hand which carries the can.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

SALLES, J. *An improved apparatus for printing and stamping.* Dated May 29, 1857. (No. 1519.)

This is intended chiefly for the use of post-offices to stamp upon letters the name of the office through which they pass, with the date. It cannot be clearly described in detail without engravings.

HEINEMANN, L. and A. *Improvements in those parts of printing machines called "doctors."* Dated May 30, 1857. (No. 1523.)

The inventors make "doctors" entirely of glass.

CHAPUIS, P. B. *Improvements in machinery for manufacturing ribbons, trimmings, fringes, and healds.* Dated May 30, 1857. (No. 1525.)

This consists in combinations of mechanism for working the shuttles containing the weft for weaving such materials, or the cord or thread for weaving healds. The shuttles are moved laterally as well as to and fro for causing them to pass through the sheds of the warps, and to cross each other so as to loop their threads together, each shuttle being alternately taken hold of and liberated by travelling pieces furnished with springs and catches. In weaving healds or deep fringes two moveable pins are required, around which the weft is looped by the shuttles.

KENNY, L. F. *Improvements in window-frames and sashes.* Dated May 30, 1857. (No. 1529.)

This relates to an arrangement by which window sashes are easily removed from their frames and returned; and consists in grooves being cut in the pulley styles of each sash frame, with communicating branch slots for receiving short pins, which are fixed in each side of the sashes, and by means of which pins the sashes are retained and guided, the branch slots being opened and closed by slides for the purpose.

RIDLEY, R. E. *Improvements in the permanent way of railways.* Dated May 30, 1857. (No. 1531.)

This consists of certain methods of combining elastic materials with the sleepers, chairs, and rails of railways. According to one modification a longitudinal metallic sleeper is formed, having upon its upper side vertical ribs, which include a chamber; and with this sleeper the inventor uses a rail, having upon its lower side vertical ribs, which clasp the ribs of the sleeper. In the chamber between the ribs is a block of vulcanised india rubber upon which the rail rests.

SALLES, J. *An improved safety-lock.* Dated May 30, 1857. (No. 1532.)

This consists in prolonging the bolt of a lock outside the lock, or in connecting a tail piece with a hole with a cutting inner edge to the bolt, so that the bolt cannot be withdrawn without the tail piece being moved. A lead bolt is passed through the parts and stamped up with a device on each end. This bolt must be cut before the lock can be unfastened, and for cutting it a special form of fork is provided.

PYE, G. W., and J. OLDKNOW. *Improvements in machinery for manufacturing bobbin-net or twist lace.* Dated May 30, 1857. (No. 1534.)

Here an arrangement of apparatus is applied so that the landing bars of twist lace machines may remain at rest, whilst the jacquard apparatus and other parts of the machinery perform their respective motions.

SHERRATT, T. *Improvements in time-keepers.* Dated May 30, 1857. (No. 1536.)

This relates chiefly in the application to time-keepers of a globe, by the rotation of which on its axis the time of day at various places may be indicated.

WILSON, T. *Improvements in floating bodies used in washing machines.* Dated May 30, 1857. (No. 1537.)

The inventor makes these bodies of wood of an oblate or prolate spheroidal form, a portion of the surface being flattened.

POCHIN, H. D., and J. WOOLLEY. *Improvements in the manufacture of gum from amylaceous substances.* Dated June 1, 1857. (No. 1541.)

This consists in taking farina, sago, starch, wheat starch, &c., and treating them with about one-fifth of their weight of sour

milk, butter milk, or with lactates, lactic acid, &c., in about the same relative proportions, and afterwards heating the mixture so as to convert it into gum or dextrine, possessing a greater power of thickening than that now in use.

THOMPSON, H. *Improvements in pianofortes.* Dated June 1, 1857. (No. 1545.)

The object here is to facilitate the execution, and increase the effect of "crescendo and diminuendo" passages upon pianofortes. Here the panel above the keys is closed by a series of parallel laths which are mounted upon pivots at each end. These laths may be arranged vertically or horizontally, are kept closed by springs, and are connected by cranks and rods to an additional pedal, by depressing which they are opened, turning upon their pivots in the manner of "louvres" or venetian blinds.

SLATER, J. *An improvement in ploughs.* Dated June 1, 1857. (No. 1546.)

This consists in coating the cast-iron mould board and metal parts which turn over the earth with glass or vitreous compound.

HOGA, S. *An improvement in coating the surfaces of the cells of galvanic batteries, and also the surfaces of crucibles.* Dated June 1, 1857. (No. 1547.)

This consists in coating the cells of galvanic batteries, and also crucibles, by the deoxidation of platinum and iridium by heat when applied to such surfaces.

WRIGHT, R. *Improvements in steam boilers.* Dated June 1, 1857. (No. 1548.)

This consists, 1st, in constructing boilers with a double casing of plates having a water space between them. 2d, in constructing a framing called the boiler-frame, formed of a series of tubes filled with water, the ends of which terminate in two hollow discs or boxes of a form made to fit the outer boiler, a space being left at the end next the fire-box for the admission of the flame, which plays around the exterior of the tubes, and passes from thence through an opening in the outer boiler into the flue. 3d, in constructing a similar frame called the furnace-frame, with hollow tubes filled with water, which he places in the fire-box below the fire. 4th, in introducing in the furnace-frame a series of air tubes passing through the water space, for the admission of air to the back of the furnace, which air is made to pass from the ash-pit in a heated state, and produces combustion. 5th, in introducing a jet of waste steam from the cylinders into the fire-box, in which are placed pieces of scrap iron, which, becoming heated, abstract the oxygen from the steam, and leave the hydrogen to be consumed in the furnace. 6th, it relates to a safety valve; and the advantages presented are a direct weight acting in opposition to the pressure of steam, and the same, being placed within the receiver or boiler, cannot be tampered with.

MULLER, H. L., jun. *A new means of advertising.* Dated June 1, 1857. (No. 1549.)

This consists in producing advertising notices on playing cards, billiard balls, dominoes, &c., &c.

SHAW, C. *A new or improved manufacture of mats for photographic and other pictures.* Dated June 2, 1857. (No. 1550.)

This consists in manufacturing the above mats of card or paper, plain or coloured, and gilded or partially gilded, and covered with a metallic coating.

CLARK, W. S., and B. MOORE. *Improvements in animal traps.* Dated June 2, 1857. (No. 1551.)

This invention cannot be described without engravings.

FONTAINEMOREAU, P. A. L. DE. *Improved means of floating submerged bodies.* (A communication.) Dated June 2, 1857. (No. 1552.)

This consists in raising submerged bodies by means of linen bags filled with gas, &c.

ALLEN, J., and J. GIBSON. *An improved union joint.* Dated June 2, 1857. (No. 1554.)

Here the inventors pass each end of the hose at once into the interior of the socket of each of the joints, which interior is of a conical form. In the inside of the hose (which fits the coned part of the socket) a conical ring is placed, and pressed tight against the hose end by means of a screwed washer.

CORRADO, N. *Improvements in purifying fatty matter.* Dated June 2, 1857. (No. 1556.)

This consists in purifying fatty matters by crushing the crude fat by means of a roller at the bottom of the vessel, and washing it with water.

ARROWSMITH, P. R., and R. CAUNCE. *Certain improvements in machinery for carding cotton and other fibrous materials.* Dated June 3, 1857. (No. 1557.)

This relates to "Evan Leigh's" patent carding engines," and consists,—1. In supporting the top cards when being ground in segmental shaped guides of the same radius as those that support the top cards while passing around the main cylinder of the carding engine; by this means the teeth of the top cards are set to about the same radius as the circumference of the main cylinder, and a greater contact surface is obtained between the main cylinder and the top cards. 2. In raising the chain of top cards above the main cylinder, and in stripping the top cards before they are

again brought into contact with the main cylinder.

CHAPPUIS, P. E. *Improvements in stereoscopes.* Dated June 3, 1857. (No. 1558.)

This consists in the use of metallic reflectors upon stereoscopes, for increasing the intensity of light brought to bear on the objects viewed.

ROBERTSON, C. *An apparatus for cleaning the bottoms of iron ships while afloat.* Dated June 3, 1857. (No. 1560.)

This consists of a pair of scraping plates, kept apart by a block of wood which renders them buoyant, and moved along under the ship by chains lowered from on board, on which chains are placed plates to assist in the operation.

LEES, S., J., and F. *Improvements in machinery for warping cotton, worsted, and other fibrous substances.* Dated June 3, 1857. (No. 1561.)

The object here is, producing a more uniform tension upon the yarn as it is drawn off the revolving reel or skeleton frame upon which it is wound, and this the inventor effects under one modification of the invention by gathering the separate threads of the yarn together in the usual way, and then passing each through holes in a bar which has a reciprocating motion imparted thereto.

MORAND, S. *Improvements in apparatus used for stretching and drying fabrics.* Dated June 3, 1857. (No. 1563.)

Here the links of the chains to which the pins are applied, and by which the fabrics are held when being stretched and dried, are each made with bosses on both sides, and the wheels which actuate the chains are made with teeth to gear with the bosses on the links of the chains.

REMINGTON, G., and J. B. BALCOMBE. *Improvements in locomotive engines, applicable to common roads.* Dated June 3, 1857. (No. 1564.)

This relates to the application to locomotive engines of endless chains extending from the fore to the hind wheel, the links of which, as they are laid upon the ground, form a way for the wheels to pass over.

DYBLEY, G. *Improved means for preventing the explosion of steam boilers.* Dated June 3, 1857. (No. 1565.)

This consists in fixing to the safety valve of boilers a float and lever, which, when the water sinks below a certain level, will lift the safety valve, and thereby allow the steam to escape. Also in the use of a steam whistle, fixed on the end of a pipe, that communicates with the inside of the boiler, and is combined with a cock worked by a float.

BROOMAN, R. A. *Improvements in gas burners.* (A communication.) Dated June 3, 1857. (No. 1566.)

This consists in the employment, in a peculiar manner, of a supplemental cap to a gas jet or burner, for causing the gas to issue in the form of a flat jet.

BARR, W. *Improvements in actual measurement for delineating garments.* (A communication.) Dated June 3, 1857. (No. 1568.)

On a ruler twenty-two inches long are arranged eleven scales, taken from fractional parts of actual measurement, with seven other graduated scales of fractional parts of the measure of other parts of the frame. These scales are used in cutting garments of every description.

THERRIN, L. P. *Improvements in railway breaks, applicable to railway carriages, called railway lever breaks.* Dated June 4, 1857. (No. 1569.)

These breaks work behind each wheel by means of two horizontal and longitudinal iron bars, supported by two lever branches, pinned to a transverse spindle, resting upon bearings strongly fixed up to the bottom floor of the carriages. The bars continue all the length, being joined at each end of every carriage by a joined band, disposed so as to make the spindle turn. It is under the locomotive tender that the different pieces which move the breaks are arranged, and even with the bottom of the tender are fixed two cast-iron supports, in which two right angles are fastened with pegs at the extremity of their angle, so that they may turn with facility. At the extremities of two of the arms of the right angles are fixed with pegs the ends of the bars. At the extremities of the other arms of the right angles are fixed the end of two upright pieces, attached to two levers, bearing chains at their extremities, which, by means of an iron windlass carrying spokes and ratchet wheels, and worked by the guard, set the system in motion.

JENNINGS, H. C. *Improvements in the manufacture of paper, papier mâché, and other similar substances.* Dated June 4, 1857. (No. 1570.)

The inventor heats the grains of the spent wash of breweries and distilleries by a steam coil. To them he adds common soda, rendered caustic by lime, and thereto adds an equal bulk of water to the residual matter to be operated upon. Then he heats up to about 200° Fah., and continues the same for about one hour. He then draws off the super-natent red-coloured liquid, and pours on fresh clear water. When the residual matter is drained he adds sulphuric acid, and when these have remained in contact

for about ten minutes, he pours on the mass a saturated solution of chloride of lime in such proportions as will destroy all the colour and render the pulp white and fit for manufacturing into paper.

PROVISIONAL PROTECTIONS.

Dated January 5, 1858.

17. John Platt, of Oldham, mechanical engineer. Improvements in machinery or apparatus for spinning and doubling or twining cotton and other fibrous materials.

Dated January 21, 1858.

108. John Joshua Robinson, of Fratton, near Portsea, Hants, schoolmaster. Improved apparatus for sorting and stamping letters, books, newspapers, and other articles.

Dated January 29, 1858.

161. Edward Hammond, of Herbert-street, Hoxton. The manufacture of cap fronts, and applicable to the manufacture of ruches, ribbon trimmings, and other articles of millinery.

Dated February 1, 1858.

177. Thomas Heppleston, of Manchester, machine maker. Certain improvements in machinery or apparatus for doubling, twisting, and reeling yarns or threads.

179. James Alexander Manning, of the Inner Temple, Esq. Improvements in the manufacture or production of manure.

181. James Childs, of Belmont, Vauxhall. An improvement in the manufacture of the boxes or cases used for night lights.

183. Josiah Haste, of New Dock Works, Leeds, mechanical engineer. Improved apparatus for preventing the explosion of steam boilers.

185. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., Editor of the *Mechanics' Magazine* and Patent Agent. Improvements in sewing machines. A communication.

Dated February 2, 1858.

187. William Cartwright Holmes and William Hollinshead, of Huddersfield, gas engineers. Improvements in the manufacture of gas, and in apparatus employed therein.

189. William Edward Newton, of Chancery-lane. An improved instrument for sharpening the blades of knives. A communication.

191. William Westley, of Birmingham, boot and shoe manufacturer. Certain improvements in the construction of heels for boots and shoes.

Dated February 3, 1858.

193. Edmund Moss, of Manchester, machinist. Improvements in weighing cranes.

195. Alfred Hollis and Stephen Lee, both of Darlington, engineers. Improvements in the construction of chaldron-wagon and other railway wheels.

197. Ernest François Dillage, of Boulevart Poissonniere, Paris, manager. Improvements in machinery or apparatus for raising, forcing, and exhausting fluids, air, and gases. A communication.

199. Leon Salles de la Magdeleine, gentleman, of Paris. An improved manure.

201. William Longley, of Erith, Kent, miller. Improvements in apparatus for grinding and splitting grain.

Dated February 4, 1858.

203. Joseph Harrison, of Brailsford, Derby, farmer. Improvements in apparatus for making cheese.

204. Robert Harland, of Derby, carriage superintendent. Improvements in the break lever guard of railway trucks.

205. David Smithies, of Manchester, heald knitter. Improvements in the manufacture of healds or harness for weaving.

206. Benjamin Beale, of Greenwich, engineer. Improvements in apparatus for paying out and drawing in electric telegraph cables, applicable also to the raising and lowering of weights.

207. John Avery, of Essex-street, Strand. An improvement in mechanical movements for sewing and other machines. A communication from J. Hanley, of New York.

208. David Williams, of Tredegar, Monmouth, miner. Improvements in the construction of ovens or furnaces for the manufacture of coke, and in the means of emptying or discharging the same.

209. George Bertram, of Edinburgh, engineer, and William McNiven, of Polton Mill, Lasswade, manager. Improvements in the manufacture of paper.

210. Charles Knight, of St. John's Wood. An improved railway guide.

211. Julius and Louis Goodman, of Finsbury-street, Finsbury-square. An improved portable umbrella.

212. William Rhodes, of Manchester, oil refiner, and Henry Napier, of Brooklyn, United States, manufacturing chemist. The production of a new paint oil.

Dated February 5, 1858.

213. Alexander Crichton and Matthew Whitehill, of Paisley, manufacturers. Improvements in the application, adaptation, and use of knitted fabrics.

214. Edward Collingwood, watch-maker, and Thomas Collingwood, surgeon, both of Rochdale. Certain improvements in machinery or apparatus for propelling vessels on water.

215. Adam Woodward, engineer, and William Carter Stafford Percy, machinist, both of Manchester. Improvements applicable to hoists and other apparatus or machinery for raising and lowering weights, designed as a provision against accidents to which such apparatus or machinery is liable.

216. James Welch, of Southall. Improvements in railway and other carriage breaks.

217. Sir Charles Shaw, of Chapel-place, Cavendish-square. Improvements in constructing moveable or field batteries.

218. Samuel Williamson, of Cork, tinplate-worker. Improvements in the construction and mode of affixing street and other gas lamps or lanterns.

219. Samuel Dyer, of Bristol, master mariner. Improvements in the method of reefing, furling, and securing all the sails of ships or vessels.

Dated February 6, 1858.

222. William Potts, of Handsworth, Stafford, manufacturer. Improvements in painting upon glass, and in protecting paintings upon glass.

224. William White and Josiah Parlby, of Great Marylebone-street, architectural decorators. Improvements in the preparation or treatment of carton-pierre, papier mâché, and such like plastic substances, and in the application of such matters to walls, ceilings, and other internal parts of buildings, berths and other parts of ships and other vessels, carriages, and other structures.

225. William Ball, of Rothwell, near Kettering, iron and brass founder. Improvements in the construction of ploughs.

226. John Miller, of Upper George-street, Edgeware-road, confectioner. Improvements in machinery for the manufacture of bread. A communication.

Dated February 8, 1858.

227. Robert Wilson, of Liverpool, ship owner. Improvements in propelling navigable vessels.

228. François Mathieu, of Lawrence-lane, City. Improvements in stereoscopes.

229. Julius Decimus Tripe, of the Commercial-road East, gentleman. Improvements in apparatus for securing window sashes or casements. Partly a communication.

230. Pierre Simon Meroux, of St. Denis, France, mechanic. Improvements in fire-bars and grates for furnaces or other fire-places.

231. Robert Cunningham, of Paisley, card perforator. Improvements in or connected with the production of letter press printing surfaces and surfaces used in reproducing ornamental patterns or devices by printing or otherwise.

232. Edward Dench, of Chelsea, hot house builder. An improved boiler for heating water for heating and warming.

233. Richard William Johnson, of Oldbury, Worcester, railway carriage builder, and William Stableford, of the same place, engineer. Improvements connected with the break levers of railway waggons.

234. William Edward Newton, of Chancery-lane. Improved machinery or apparatus for breaking stones, minerals, and other analogous substances. A communication from L. Busquet, of Paris.

235. Henry Ball, of Birmingham, gun-manufacturer. Improvements in repeating and other fire-arms, a portion of which improvements may be applied to ordnance.

236. Edward Reader and John Dewick, both of Finkhill-street, Nottingham, machinists. Improvements in lace machinery for the manufacture of velvet lace and looped fabrics and in the fabrics manufactured by such machinery.

Dated February 9, 1858.

237. Charles Askew, of Charles-street, Hampstead-road, coppersmith, and David Ritchie, of William-street, Regent's-park, engineer. Improvements in roasting machine for meat, poultry, or game of any kind, to be worked by spring jack movements or by the ordinary smoke jack.

238. John Wells, of Percival street, Clerkenwell, watch case maker. Improvements in watch cases.

239. William Brown and Charles Neale May, both of Devizes, Wilts, engineers. Improvements in sluice valves.

242. Evan Leigh, of Manchester, mechanical engineer. Certain improvements in carding engines for carding cotton and other fibrous materials.

243. John Taylor, of Swanton Novers, Thetford, Norfolk, farm bailiff. An improvement in the construction of horse-hoes, applicable also to drills.

245. Richard Carte, of Charing-cross, military musical instrument maker. Improvements in clarinets.

246. Ebenezer Stevens, of Cambridge-road. Improvements in machinery for preparing dough, paste, and like articles.

Dated February 10, 1858.

250. Robert Aytoun, of Edinburgh, writer to the Signet. Improvements in safety cages or apparatus for mines.

252. John Chatterton, of Devonshire street, Islington. An improvement in electric telegraph wires and in insulating telegraph wires.

PATENT APPLIED FOR WITH COMPLETE SPECIFICATION.

248. William Stettinius Clark, of the Atlas Works, Dorset-square. Improvements in copying presses. A communication from W. M. Smith and P. Hannay, of Washington. Dated February 10, 1858.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," February* 23, 1858.)

2598. G. F. Lombard. Improvements in steam engines.

2607. G. Beard. Improvements in mechanism for producing impressions on paper or other surfaces.

2609. W. Calvert. Improvements in obtaining motive power by the action of the wind.

2617. J. H. Simpson. Improved machinery or apparatus for making bands or ropes of straw, hay, or other fibrous substances.

2628. F. H. Holmes. Improvements in magneto-electric machines.

2634. E. Wilkins. Improvements in frames for horticultural and vegetative purposes.

2635. W. A. Rooke. Using and employing dextrine in the making and sizing of paper.

2636. C. Reeves. An improvement or improvements in the manufacture of swords, matchets, and knives.

2641. H. A. L. Negretti and J. W. Zambra. Improvements in producing graduated scales and other signs, letters, numerals, characters, and pictorial representations upon porcelain and other ceramic and enamelled materials, which improvements are applicable to the graduated scales of meteorological and other philosophical instruments.

2646. G. Scarr and J. Pollard. Certain improvements in power looms for weaving.

2648. D. Guthrie and J. Vavasseur. A machine for cutting, chipping, or rasping dye-woods, or other similar fibrous substances, for the purpose of obtaining extracts.

2651. J. Bernard. Certain improvements in the manufacture or production of boots and shoes or other coverings for the feet, and in machinery, apparatus, and materials to be employed in such manufacture.

2657. J. Bentley. Improvements in fire arms.

2659. J. Eastwood. An improvement in working the valves of steam hammers by a direct self-acting motion.

2665. J. J. Sieber. Improvements in power looms. A communication.

2670. B. Barnard and A. Rosenthall. A new ornamental fringe or fringed fabric, also the means of producing the same.

2677. D. Patridge. Improvements in shaft bearings.

2716. J. Ferrabee and C. Whitmore. Improvements applicable to machinery for carding, scribbling, and condensing wood and other fibrous substances.

2721. J. Newall. Improvements in railway breaks and signals, and in the machinery or apparatus for working the same.

2736. W. Clark. Improvements in the manufacture of murexide. A communication.

2738. W. E. Newton. Improvements in the manufacture of sewing silk, twist, and different kinds of threads. A communication.

2749. D. Allison and J. Livingston. Improvements in machinery or apparatus for regulating the weight or pressure to top rollers used in spinning or preparing fibrous materials to be spun.

2798. W. F. Batho and E. M. Bauer. Improvements in machinery or apparatus for drilling and boring metals, and also for cutting key-ways and cotter holes.

2803. C. Clay. Improvements in machinery for grubbing or cutting up weeds and otherwise scarifying and cultivating land.

3045. C. Westendarp, Jun. Preparing a material as a substitute for ivory, which he proposes calling "artificial ivory."

3098. J. J. Davis. Improvements in presses for printing or endorsing and embossing.

2. J. Murphy. Improvements in wheels used on railways.

38. R. Brown. Improvements in water-closets, parts of which are applicable to pumps.

54. E. B. Bright. Improvements in communicating signals by electricity, and in the apparatuses employed therein.

110. P. Wilson, S. Northall, and T. James. Improvements in locks and latches.

124. N. A. Drouet and P. P. Le Coq. Improvements in treating chloride of sodium for obtaining therefrom certain useful products.

162. J. Elder. Improvements in the arrangement or construction of steam engines and boilers.

192. J. Gray. Improvements in printing machinery.

208. D. Williams. Improvements in the construction of ovens or furnaces for the manufacture of coke and in the means of emptying or discharging the same.

213. A. Crichton and M. Whitehill. Improvements in the application, adaptation, and use of knitted fabrics.

224. W. White and J. Parlby. Improvements in the preparation or treatment of carton-pierre, papier mâché, and such like plastic substances, and in the application of such matters to walls, ceilings, and other internal parts of buildings, berths, and other parts of ships and other vessels, carriages, and other structures.

237. C. Askew and D. Ritchie. Improvements in roasting machines for meat, poultry, or game of any kind, to be worked by spring jack movements or by the ordinary smoke jack.

250. R. Aytoun. Improvements in safety cages or apparatus for mines.

252. J. Chatterton. An improvement in electric telegraph wires and in insulating telegraphic wires.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

361. John Oxley.
367. David Hulett.
374. Frederick Blacket Edward Beaumont.
386. Frederic Prince.
389. Paul Prince.
390. Charles Low.
398. William Hartcliffe and Joseph Waterhouse.
409. Barnaby Angelo Murray.
453. Thomas Sadleir.

LIST OF SEALED PATENTS.

Sealed February 19th, 1858.

2010. Julien d'Helle and Albert Viscount de Waresquiel.

Sealed February 23d, 1858.

2236. George Daniel Davis.
2243. John Gedge.
2248. Henry Parry.
2251. John Jervis Tucker and George Blaxland.
2252. Werner Staufen.
2255. Philip Hill and John Moore.
2256. John Gedge.
2258. William Hargreaves.
2268. Charles Thompson and James Thompson.
2274. John Drumgoole Brady.
2382. William Jenkins.
2384. David Thorpe Lee.
2404. Richard Brown.
2406. Peter Armand le Comte de Fontainemoreau.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Dates of Registration.	Nos. in the Register.	Proprietors' Names.	Addresses.	Subjects of Design.
Jan. 29	4048	A. Todd	Ardwick	Invalid's Bed Table.
Feb. 2	4049	Murray and Heath	Piccadilly	Reflectors for Stereoscopes.
,,	4050	W. Cooper	Birmingham	Stud or Fastener.
4	4051	Rudal, Rose, Carte, & Co.	Charing-cross	Configuration of a Drum.
6	4052	H. F. Lawes	Bristol	Paragon Shirt.
8	4053	Edinburgh Machine Sewing Company	Edinburgh	Corset Fastener.
,,	4054	Thewles and Griffiths	Warrington	Churn Driving Apparatus and Stand.
,,	4055	J. P. Oates	Erdington	Piston Valve for Musical Instruments.
12	4056	J. Hoare	Old Fishbourne, Sussex	Hand Seed-planting Machine.
13	4057	R. and T. A. Sorby	Sheffield	Sheep Shears.
16	4058	J. Armstrong	Irthington, Cumberland	Life Preserver.
17	4059	J. Chesterman	Sheffield	Spring Hat Suspender.
22	4060	C. Weintraud, jun.	King-street, Cheapside	Purse.

PROVISIONAL REGISTRATIONS.

Jan.	28	955	D. S. Brown	Old Kent-road	Stereoscope.
Feb.	3	956	T. Truss	Chester	Roof Lamp.
	9	957	A. Pilbeam	Adam-street, Adelphi	Unique Folding Stool.
	,,	958	J. Sharp	Great Russell-street	Eccentric Knife-cleaning Machine.
	10	959	W. Garfield	Birmingham	Gas Carbonizer.
	12	960	A. Smart & J. Howland	Fenchurch-street	Smokers' Sweet-heart.
	13	961	M. Turner	Birmingham	Discharging Penholder.
	22	962	S. Davis	Mount-street, Whitechapel	Inflated Knee Cap.

NOTICES TO CORRESPONDENTS.

R. Jackson.—Patents are only granted in America to the first and true inventor; the fact of the British Patent having been previously obtained would prevent a valid Patent being granted to a citizen of the United States, or to any other than the first and true inventor.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

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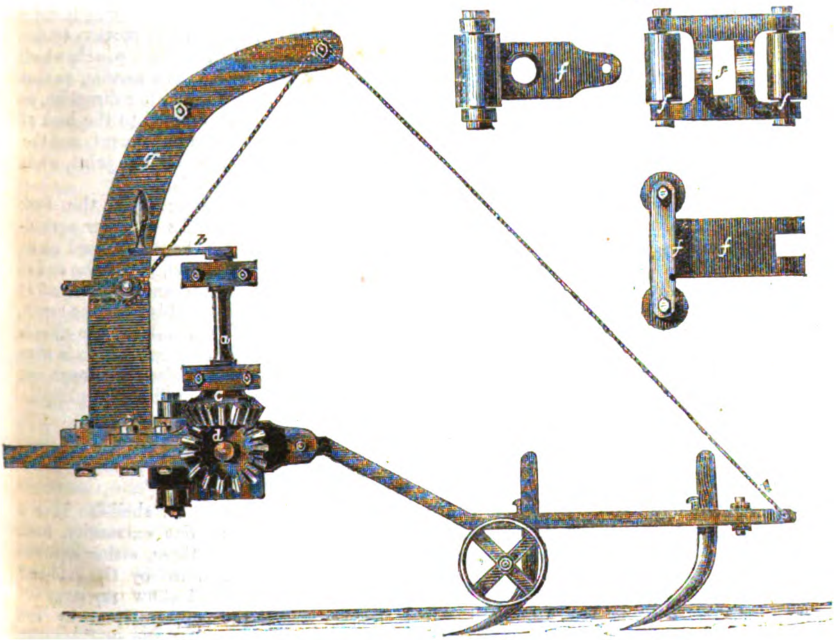
SMITH'S PATENT IMPROVEMENTS IN STEAM ENGINES FOR GIVING MOTION TO AGRICULTURAL IMPLEMENTS.

Fig. 1. Fig. 3.



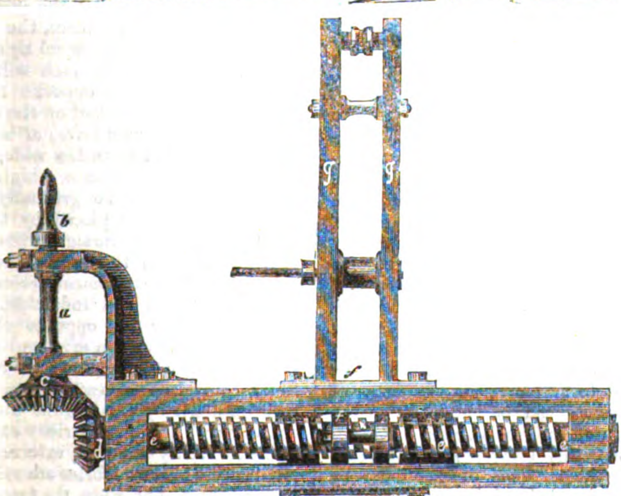


Fig. 2.

SMITH'S PATENT IMPROVEMENTS IN STEAM ENGINES FOR GIVING MOTION TO AGRICULTURAL IMPLEMENTS.

PATENT DATED 10TH JULY, 1857.

THIS invention, by Mr. W. Smith, of Little Woolstone, Fenny Stratford, Bucks, has for its object improvements in steam engines for giving motion to agricultural implements, and consists in arranging the back of the engine so that the implement attached thereto may be guided or moved sideways in either direction, and also so that the implement may be raised out of the earth by means of a crane attached to the back of the engine. For this purpose the agricultural implement is attached by a hinge joint to a slide which slides between guides at the back of the engine; and Mr. Smith prefers to give motion to this slide by means of a screw, on one end of which there is a bevelled toothed wheel, which takes into another bevelled toothed wheel on the axis of which there is a handle, so that by turning this handle the slide may be moved from side to side in either direction, as desired. In order to raise the implement out of the land, a crane is fixed to the back of the engine, the chain of which crane is fixed to the back end of the implement, and the implement being connected to the slide at the back of the engine by a hinge joint, when the crane is turned the back of the implement is raised up out of the land.

Fig. 1 is a side view and fig. 2 an end view of the platform at the back of a Boydell's or other locomotive engine, suitable for hauling ploughs or other agricultural implements. *a* is a vertical axis, having on its upper end a handle, *b*, and on its lower end a bevelled wheel, *c*, which works with another bevelled wheel, *d*, on the end of the screw, *e*, running from side to side of the platform. *f* is a slide, shown in detail at fig. 3; it has a hole through it, in which a screw is cut, and through this hole the screw, *e*, passes, and when this screw is turned in either direction by the handle, *b*, the slide is traversed, and it carries with it the plough or other agricultural implement, which is thus with facility guided so as to produce a straight furrow. In order to raise the plough out of the land, the crane, *g*, is employed, from which a rope passes to the tail of the plough.

PROFESSOR FARADAY ON STATIC INDUCTION.

THE "Faraday Night" at the Royal Institution, which is generally considered the culmination of scientific discourse for the year, took place at the weekly evening Meeting, held on Friday, Feb. 12, 1858, his Royal Highness the Prince Consort, K.G. D.C.L., F.R.S., Vice-Patron, in the chair. The subject of the remarks of the renowned Professor was "Static Induction."

The object of the speaker was to give to the members of the Royal Institution a simple reference to the production and nature of the static phenomena of electricity; especially in respect of induction, into which, indeed, they all resolve themselves. When flannel, shell-lac, metal, and sulphur are any two of them rubbed together they become electrified in the well-known manner; and in such order that any one of them becomes negative to those which precede it in the list, or positive to those which follow. Thus, metal becomes negative to shell-lac, and positive to sulphur; and as either of these substances can be employed in the investigation of the fundamental principles of induction, this difference is important in some of the methods of examining by the electrometer their temporary or permanent state. If a stick of shell-lac have a flannel cap fitted to one extremity, both being unexcited, and these, either separate or associated, be examined by the gold-leaf electrometer, they will show no signs of electricity. If the cap, grasped by the hand, be turned round on the shell-lac with friction, but left in its place, the associated substances will still show no signs of electricity. If separated, each will show a strongly excited state opposite to that of the other. If one be laid on the cap of the electrometer (the gold leaves of which were 7 inches long and 1¼ inches wide, with perfect insulation) it will show a highly excited state; if the other be gradually brought near, and finally be placed by the side of the first, all the electric signs will disappear, to reappear when the separation is again produced. The experiment presents a type case of excitation and induction. By the friction together the opposite electricities are excited; they then exist and keep their state by mutual induction; they are perfectly equivalent to each other, and hold their existence by this definite and relative equivalency; for one electricity cannot exist by itself. They show no external signs of electricity whilst the forces are related only to each other, but when the two bodies in

which the states are located are separated, then this relation is not exclusive, but by so much as the induction is diminished between the two substances, it is thrown in other directions; as towards the electrometer, or the walls of the room. When one is carried into a separate room, or put into a vessel of conducting matter, then the excited bodies become independent of each other; each has raised up an exactly equal amount of the contrary force by action terminating at a distance, according to the laws of ordinary induction. The power exerted by each excited body in this distant action may be expressed by the term, lines of force. These lines, or the force they represent, is sustained, so long as they are contained in or pass through an insulating medium. They continue, until meeting with conducting matter they evolve the contrary state to that at which they originate, and in the equivalent proportion, and so terminate the insulation; or, failing that, they continue their course outwards. If it were possible to place the excited shell-lac in the centre of an almost infinite extent of insulating medium, the lines of force would be as infinitely extended from it. If the power at any section of the whole of the lines of force could be compared with that at any other section, they would be found equal to each other; though one section might be close to the shell-lac, and the other at an infinite distance. If there were no conducting matter at the boundaries of the insulating space above supposed, the shell-lac could not exist independently in the excited state: it would then keep its lines of force altogether turned upon the body by which it had first been excited, the induction between the two being sustained by their reciprocal action, without which electricity could neither be excited nor exist. Such are some of the consequences which follow inevitably upon the laws of static induction, combined with the law of the conservation of force.

But if this function of induction be so essential to the very existence of electricity in its developed or active state, what is its nature? It acts through distance and across intervening bodies: how are the space and the bodies affected? In all actions at a distance it is most important to ascertain, if possible, what occurs in the intervening medium, or the interposed space; whether the investigation ends in the establishment of a particular process for the particular case, or the reference of the process to any more general mode of action representing all cases of distinct action.

Induction acts across any insulating body, whether it be solid, fluid, or gaseous. Common air is concerned in most inductive actions, but, being mobile, its particles cannot be retained in a given place, position, or state, so as to allow of close examination. Sulphur and shell-lac are excellent bodies as subjects of investigation, the more especially as their *specific inductive capacity* is about twice that of air; and, being solid bodies, their superficial or bounding particles can be thrown into a given state, yet preserved in their place to be examined with the purpose of showing what that state is. If a round plate of metal, 9 inches in diameter, be set up vertically in the air and insulated, and a like plate of good gutta-percha raised on an insulating pillar be placed parallel to and about 9 inches from it; then, upon exciting the gutta-percha, strong induction occurs. The gutta-percha presents the inductric, the copper-plate the inducteous, surfaces which limit the field of induction, which field supplies an excellent place for experiment. The gutta-percha should be excited by a piece of close broad cloth, free from loose particles and all dust, or other sources of convective effects should be avoided. Plates of sulphur, about 3 or 4 inches square, and 1 inch thick, may be employed as the inductive medium, and these having white silk loops introduced into the edges when cast, may, by the further use of white silk slings, be suspended or handled with perfect facility. Some discs of stiff paper, gilt on both sides, being attached at the edge to thin stems of shell-lac, are thus well insulated, and serve either as metallic plates or carriers.

It is almost impossible to take a block of sulphur out of paper, or from off the table, without finding it electric; if, however, a small spirit-lamp flame be moved for a moment before its surface at about an inch distance, it will discharge it perfectly. Being then laid on the cap of the electrometer it will probably not cause divergence of the gold leaves; but the proof that it is in no way excited is not quite secure until a piece of uninsulated tinfoil or metal has been laid loosely on the upper surface. If there be any induction across the sulphur, due to the feeble excitement of the surfaces by opposite electricities, such a process will reveal it: a second application of the flame will remove it entirely. When a plate of sulphur is excited on one side only, its application to the electrometer does not tell at once which is the excited side. With either face upon the cap the charge will be of the same kind, but with the excited side downwards the divergence will be much,

and the application of the uninsulated tinfoil to the top surface will cause a moderate diminution, which will return as the tinfoil is removed; whereas, with the excited side upwards, the first divergence of the leaves will be less, and the application of the tinfoil on the top will cause considerable diminution. The approximation of the flame towards the excited side will discharge it entirely. The application near the unexcited side will also seem partly to discharge it, for the effect on the electrometer will be greatly lessened; but the fact is, that the flame will have charged the second surface with the *contrary* electricity. When, therefore, the originally excited surface is laid down upon the cap of the electrometer, a diminished divergence will be obtained, and it is only by the after application of uninsulated tinfoil upon the upper surface that the full divergence due to the lower surface is obtained.

Being aware of these points, which are necessary to safe manipulation, and proceeding to work with a plate of sulphur in the field of induction before described, the following results are obtained:—A piece of uncharged sulphur being placed in the induction field parallel, of course, to the gutta percha and copper plates, and retained there, even for several minutes, provided all be dry and free from dust and small particles, when taken out and examined by the electrometer, either without or with the application of the superposed tinfoil, is found without any charge. The gilt plate carrier before described, if introduced in the same position and then withdrawn, is found entirely free of charge. If the sulphur plate be in place, and then the carrier be introduced and made to touch the face of the sulphur, then separated a small space from it, and brought away and examined, it is found without any charge—and that whether applied to either one side or the other of the block of sulphur. So that any of these bodies, which may have been thrown into a polarized or peculiar condition, whilst under the induction, must have lost that state entirely when removed from the induction, and have resumed their natural condition. Assuming, however, that the sulphur had become electrically polarized in the direction of the lines of induction, and that, therefore, whilst in the field one face was positive and the other negative, the mere touching of two or three points by the gold-leaf carrier would be utterly inefficient in bringing any sensible portion of this charge or state away; for though metal can come into *conduction contact* with the surface particles of a mass of insulating matter, and can take up the state of that surface, it is only by real contact that this can be done. Therefore the two sides of a block of sulphur were gilt by the application of gold leaf on a thin layer of varnish, and when the varnish was quite dry and hard, this block was experimented with. Being introduced into the induction field for a time, and then brought away, it was found free from charge on both its surfaces; being again introduced, and the carrier placed between it and either the gutta-percha or the copper plate, but not touching these or the sulphur, the carrier, when brought away, showed no trace of electricity. The carrier being again introduced at the inductive or gutta-percha side, made to touch the gilt surface of the sulphur on that side, separated a little way and then brought out to be examined, gave a positive charge to the electrometer: when it was taken to the other side of the sulphur and applied in the same manner, it brought away a negative charge. Thus showing that, whilst the sulphur was under induction, the side of it towards the negative gutta-percha was in the positive state, and the side towards the positive inducteous surface of copper bounding the extent of the induction field was in the negative state. Thus the dielectric sulphur, whilst under induction, is in a constrained polar electrical state, from which it *instantly* falls into an indifferent or natural condition the moment the induction ceases, either by the removal of the sulphur or the gutta-percha. That this return action is due to an electrical tension *within* the mass, sustained while the act of induction continues, is evident by this—that if the carrier be applied two or three times alternately to the two faces, so as to discharge in part the electricity they show under the induction, then, on removing the sulphur from the induction field it returns, not merely to neutrality or indifference, but the surfaces assume the opposite states to what they had before—a necessary consequence of the return of the mass of inner particles to or towards their original condition.

The same result may be obtained, though not so perfectly, without the use of any coatings. Having the uncoated sulphur in its place, put the small spirit lamp between it and the copper plate; bring up the excited gutta-percha to its place, remove the spirit lamp flame, and then the gutta-percha, and, finally, examine the sulphur: the surface towards the flame, and *that only*, will be charged—its state will be found to be positive, just like the same side of the gilt sulphur which had been touched two or three times by the carrier. During the induction, the mass of the sulphur had been

polarized, the anterior face had become positive, the posterior had become negative, the flame had discharged the negative state of the latter, and then, on relieving the sulphur from the induction, the return of the polarity to the normal condition had also returned the anterior face to its proper and unchanged state, but had caused the other, which had been discharged of its temporary negative state, whilst under induction, now to assume the positive condition. It would be of no use trying the flame on the other side of the sulphur plate, as then its action would be to discharge the gutta-percha and destroy the induction altogether.

When several plates were placed in the inductive field apart from each other, subject to one common act of induction, and examined in the same manner, each was found to have the same state as the single plate described. It is well known that if several metallic plates were hung up in like manner, the same results would be obtained. From these and such experiments the speaker took occasion to support that view of induction which he put forth twenty years ago,* which consists in viewing insulators as aggregates of particles, each of which conducts within itself, but does not conduct to its neighbours, and induction as the polarization of all those particles concerned in the electric relation of the inductric and inducteous surfaces; and stated that, as yet, he had not found any facts opposed to that view. He referred to specific inductive capacity, now so singularly confirmed by researches into the action of submarine electro-telegraphic cables, as confirming these views; and also to the analogy of the tourmaline, whilst rising and falling in temperature, to a bar of solid insulating matter, passing into and out of the inductive state.

* Phil. Trans., 1837.

In a letter published in last Saturday's *Athenæum* Mr. Richard Laming, of Hayward's Heath, writes as follows:—

"It is almost needless to say that Prof. Faraday's experimental observations are so accurately made as to furnish always reliable materials for inductive reasoning; but the conclusion which is drawn from them, whether by himself or others, is not invariably a safe guide; because, for want of a true view of the electrical nature and action, it is impossible at all times to be sure that the mechanical arrangements for an experiment do not introduce an unperceived source of error. I wish to point out a case of this kind, reported in your issue of the 20th inst.,* in which the removing of a mechanical source of error reverses a most imposing conclusion experimentally arrived at by the above-named philosopher. Prof. Faraday's experiment consists in so placing a plate of sulphur, previously gilded on both surfaces, as to be acted upon inductively by an electrical charge. A gilt plate 'carrier being introduced at the side where the charged or inductric body (made negative) is placed, made to touch the gilt surface of the sulphur on that side, separated a little way, and then brought out to be examined, gave a positive charge to the electrometer: when it was taken to the other side of the sulphur, and applied in the same manner, it brought away a negative charge. *Thus showing* that, whilst the sulphur was under induction, the side of it towards the negative inductric was in the positive state, and the other side in the negative state.' Now, while admitting the facts, I add that the conclusion, which seems so naturally to flow from them, assigning a positive state to the inner inducteous surface, will not bear examination. On repeating the experiment it will be found that if the negative inductric be a sphere the carrier disc placed on the inner surface of the sulphur will be negative too, unless it be near that particular part of it which is at the least distance from the inductric. Therefore, on the Professor's assumption that the carrier disc participates in the electrical state of the inner inducteous surface, that surface is partly positive and partly negative, while the whole of the other surface is negative. Secondly, wherever on the inner surface the carrier disc may be placed, it will be negative if it communicate by a long conductor with an insulated brass ball, or the knob of a Leyden phial. By these tests the whole of both the gilt surfaces of the sulphur are declared to be negative. Again, if instead of using the carrier disc to test the state of the surfaces, we uninsulate either of them for a moment, we shall then find it, on the removal of the inductric, to be positively electrical; which, on Prof. Faraday's reasoning, proves that under the inductive action both surfaces must have been negative until uninsulated. If these be matters of fact, which any one may satisfy himself of by experiment, then there are three facts denying the Professor's conclusion against one fact in favour of it."

* In which an abstract of Prof. Faraday's lecture, given above, appeared.

SUBMERGING TELEGRAPH CABLES.

THIS subject has excited considerable attention during the last week or two at the Institution of Civil Engineers. Two papers have been read, and followed by an elaborate discussion, which took place on the evening of Tuesday last. At the present we can notice the papers only. The first was—

ON SUBMERGING TELEGRAPHIC CABLES, BY MR. J. A. LONGRIDGE, AND MR. C. H. BROOKS.

The authors desire their attempt to investigate the laws, to which the operation of submerging telegraphic cables were subject, to be considered only as a partial solution of an interesting and somewhat complicated problem. It was evident that much misapprehension existed on the subject, and it had been stated at the Meeting of the British Association at Dublin, 1857, that "it seemed to be universally admitted that it was mathematically impossible, unless the speed of the vessel, from which the cable was payed out, could be almost infinitely increased, to lay out a cable, in deep waters, say two miles, or more, in such a way as not to require a length much greater, than that of the actual distance, as from the inclined direction of the yet sinking part of the cable, the successive portions payed out must, when they reach the bottom, arrange themselves in wavy folds, since the actual length is greater than the entire horizontal distance."

It was desirable to ascertain how far such a proposition was correct, and if correct, what amount of "slack," or of surplus cable, should be provided to meet the waste, in varying depths of water.

After investigating the laws of bodies, such as cables, sinking in a resisting medium, the Paper proceeded to show the great waste of cable attendant upon paying out free from tension at the ship. The form of the curve assumed by a descending cable was then examined, and the amount of tension at the paying-out vessel requisite to lay the cable without slack along the bottom estimated under various conditions. The effect of the friction of the water in decreasing this tension, and the result, as regarded the tension, of increasing the velocity of the cable beyond that of the ship, were then pointed out. It was shown that the decrease thus obtained was of small amount, unless the speed of the paying-out vessel was considerable, and that a decrease of tension should rather be sought in a diminution of the specific gravity of the cable.

The tension of the ship in 2,000 fathoms water was stated to be about 35 cwt. for a cable similar to the Atlantic cable, but with a cable of the specific gravify of 1·5 it would not exceed $7\frac{3}{4}$ cwt.

The effect of currents was then considered, and it was maintained that they did not bring any additional strain upon a cable, and involved only a small loss of length on first entering them. In a hypothetical case of a current extending to a depth of 200 fathoms, and running with a velocity of $1\frac{1}{2}$ foot per second, at right angles to the ship's course, it was calculated that the extra length of cable due to the deflecting action of the current would not exceed 28 fathoms, the velocity of the ship being 6 feet per second.

The effect of stopping the paying-out was next treated of, and it was shown that it would be to bring a very heavy catenarian strain on the cable, depending upon the depth of water and the velocity of the paying-out vessel. The amount of this strain for the Atlantic cable in a depth of 2,000 fathoms, and at a velocity of the paying-out vessel of 6 feet per second, was calculated at above seven tons.

The question of hauling in the cable was then adverted to, and the conditions under which it might be safely attempted, were pointed out.

After discussing, briefly, the effect of the pitching of the vessel upon the strain of the cable, the paying-out apparatus was referred to; and the importance of reducing its inertia, and of so constructing the breaks that they should act freely, was maintained. Two plans were then mentioned for saving the end of the cable in case of fracture, and tables were given, showing the velocity and direction taken by the end of the cable under such circumstances.

The authors then proceeded to offer some remarks upon the mechanical structure of the cable, and strongly advocated a light cable. The distinguishing feature of this (Mr. T. Allan's) system of construction was, that the whole of the metallic portion was placed in the centre, and was surrounded by the insulating material; whereas, in the Atlantic Cable, there was an outer-sheathing of wire rope twisted spirally round the insulating medium. It was shown that whilst the absolute weights of the two cables were as $21\frac{1}{2}$ to 10, their relative strengths were as 11 to 25, so that the light cable, weighing scarcely one-half of the heavy one, had nearly two and a half times its relative strength.

The effect of compression and tension on

the two constructions was then referred to, and it was maintained, that in this respect also, the light cable possessed advantages over the other.

In conclusion, the authors, while disclaiming any intention to find fault, expressed their strong conviction, that though the Atlantic Cable was a step in the right direction, as compared with the heavier cables of former days, it yet fell far short, in mechanical structure and condition, of the light system recommended by Mr. Allan and others.

The practicability of safely submerging the present Atlantic Cable was not denied, but it was strongly urged, that with a cable of its specific gravity, success would be greatly dependent upon the nature of the paying-out apparatus, and the sedulous attention of those in charge of the breaks.

The Second Paper read was—

ON THE PRACTICAL OPERATIONS CONNECTED WITH PAYING-OUT AND REPAIRING SUBMARINE TELEGRAPH CABLES, BY MR. F. C. WEBB, ASSOC. INST., C.E.

The author explained, in the first place, that through the hesitation of those who had charge of the works in publishing facts, which might affect the commercial value of such enterprises, he was unable to supply complete details of the operations performed in submerging those cables, upon which he had not been practically employed.

He then enumerated and described, in general terms, the operations connected with the cables laid down in several places; relating at the same time the causes of the failures to which some of them had been subject.

He then pointed out the route proposed for the Hague Cables, describing their construction, and the reasons which induced the engineer, Mr. Edwin Clark, to determine on adopting the small single cable system. The arrangement adopted for testing the cable during the process of construction was then explained, and the serious error of submerging cables, in their final position, without having previously tested their perfection by suitable means, was noticed. The Atlantic Cable was not tested under water, from the fear of its strength being impaired by the formation of rust. This might have been avoided by galvanizing, which was shown not to have the effect of weakening wire to the extent generally supposed.

The arrangements for coiling the cable on board the "Monarch" steamer for the Hague route were then detailed, and some remarks were made on the conditions of a coiled rope, showing the necessity of carrying the cable from the hold of the ship, when elliptical coils were used, over shears, fixed above the hatchways, to give the rope sufficient height to enable the twist, which the cable had received in coiling, to be neutralised; and, also, the advantage of circular, over elliptical coils, and the difference between a rope wound on a drum, and that coiled up in itself.

The act of speaking through a cable was not considered a sufficient test of its perfection. The case of the Atlantic Cable was instanced, where, from Professor Morse's Report, the author concluded, that a serious fault had passed unnoticed.

The Paper then proceeded to remark upon the steering of vessels across tide-ways, showing the curve that would be taken by a cable, if an allowance was not made for the effect of tides. A practical method was given, by which the required rate and direction of the vessel across a tide, could be quickly ascertained.

The operation of laying down the thick shore ends on the English and Dutch coasts were then detailed.

In making arrangements for paying out a cable, the first point for consideration was the selection of a ship. The paper discussed the relative merits of screw and paddle-wheel steamers, giving the preference to the latter, except in the case of a screw, where the engines were placed well aft, thus giving plenty of accommodation for stowing the cable. The next point for consideration was the disposition of the cable in the most convenient form for paying out freely. Accidents arising from improper coiling were quoted, and the great advantages of Mr. Newall's cone and rings for paying out were described.

The brake was the next consideration. The drum brake (of which an illustration was given) was that used on all cables hitherto successfully laid. Mr. C. Bright's brake was also mentioned, and its advantages and disadvantages were pointed out. Its chief disadvantages appeared to be its weight, or *vis-inertiæ*, and the time required to release the pressure on the brake pulley. Mechanical contrivances to supersede manipulation in the quick release of the brake were disapproved.

The curve taken by the cable in descending great depths was discussed, showing it to be concave towards the ship in every part, but approaching a straight line as it neared the ground. The angle which the cable made with the horizon, when being paid out, was about 9° or 10°, while the waste varied from 30 per cent. to 50 per cent. The necessity of supplying buoys, with suitable moorings, to provide against accidents, was next urged. Several cases were cited where the use of buoys would have prevented the loss of cables, and the

consequent waste of property. The buoyage arrangements of the Atlantic cable were described.

The danger of stopping the cable during the paying out and means of providing against accidents were represented.

The tendency of a cable astern a ship to swing it round in opposition to the action of the helm, with its effect in two or three instances, together with the means of avoiding such an event by placing the free point of the cable as near the centre of the ship as practicable, were discussed.

Whilst proper importance was attached to perfect machinery, the author was of opinion that sufficient value was not placed upon the necessity of having an organized and efficient staff.

The paper then proceeded to describe various operations connected with the repairs of cables. The operations of grappling, under-running, buoying, and picking up, were minutely described. In one instance 120 miles of cable were picked up, repaired on land, and relaid.

The paper concluded by pointing out that by such means cables could be regularly repaired, and that submarine wires in shallow seas became a much less precarious property than they were at first supposed to be.

THE DECIMAL SYSTEM.—THE UNIT OF LENGTH.

A Report on the "Unit of Length" having been prepared by the Council of the International Association for obtaining a Uniform Decimal System of Measures, Weights and Coins (British Branch), was presented to the second Annual General Meeting, held Feb. 25th, 1858. At the first Annual General Meeting, Feb. 26th, 1857, Resolutions were adopted to the effect that the Council be requested to make inquiries and to collect information on the *Units of Length and Weight*, with a view to the attainment of useful, definite, and practical results. In order to comply with this request, a set of questions was printed and circulated with a view to obtain all desirable information relative to the best *Unit of Length*, the question of the *Unit of Weight* being postponed. The first question was, whether they should adopt some new unit or fix upon a unit already in use. No less than thirteen new units came under review. It did not, however, appear that any one of these had ever been applied in practice. The Council, therefore, decided to recommend some unit already in use. On similar grounds they passed over the second's pendulum, the claims of which to preference were discussed. Notwithstanding the numerous experiments made in different parts of the globe by philosophers of the highest ability, the exact length of the second's pendulum either under the equator, or in any latitude N. or S. of the equator, is still undetermined. No pendulum now exists which is proved and generally supposed to beat seconds with the requisite accuracy. They thought it eminently desirable that the unit should be of such a length as might be adapted to measure the greatest variety of objects, and in the most numerous cases, which are likely to occur in daily life, that it should be visible at a glance of the eye, and easily carried about and manipulated by those who use it. It appeared that for these purposes an inch or a foot—much more any subdivision of these quantities—would be too short, that a fathom would be too long, but that the required conditions would be best fulfilled by any measure about the same with the ell, the metre, the second's pendulum, or the yard. The Council thought that a natural standard, adapted as far as possible to the ideas of all countries throughout the world, ought to be preferred to any which has been employed from merely traditional, arbitrary, or accidental causes. It appeared that, if the English yard were chosen, very little benefit would ensue, because no decimal multiples or divisions of the yard are anywhere in use, and, consequently, a set of linear measures must be devised entirely new, with the single exception of the yard itself. The Council were thus brought to the special consideration of the claims of the metre. The Council are of opinion that, if by any accident the prototype shall be lost or destroyed, the metre may be restored without difficulty, not by a new measurement of a meridian, but by a reference to the numerous authorized copies dispersed over the world. On proceeding to consider the metre with more especial reference to practice, the Council found that "the metre has every quality which can be desired in a unit, which is to be employed as the basis of a decimal and international system. Its binary divisions go as far as can ever be wanted. Its subdivisions and its multiples are superior in utility and ease of application to those of any other system throughout the world. Hence it is not surprising," says the Report, "that the metre has made a remarkably rapid and extensive progress, being already adopted by about sixteen nations of greater or less commercial importance in both hemispheres. It appears, also, that the use of it is sanctioned by law in this country; that it is gradually be-

coming more known and appreciated; and that it has already come into use for a variety of purposes." On the whole, the Council conclude that its adoption is advisable, not only as the means of securing great political, social, and commercial advantages to the United Kingdom, but as a demonstration of a becoming desire to cooperate with other enlightened and powerful nations in the accomplishment of a generous design, which is urged upon public attention by the strongest appeals of reason and science, of patriotism and of philanthropy.

THE "SHANNON" FRIGATE STRUCK BY LIGHTNING.

One of the most extraordinary instances of the dangers which threaten ships from this terrible element, and one also which affords certain proof of the completeness with which the recent discoveries of practical science enable us to ward off its destructive effects, occurred recently to H.M.'s frigate *Shannon*, 50, in her voyage to China, under the command of Sir William Peel. It appears from the ship's log, which has just reached the Admiralty, that during the voyage out, and when about 90 miles to the S.W. of Java, the vessel became completely enveloped in one of those terrific thunderstorms so prevalent in those latitudes. The log describes the approach of the storm at 4.50 p.m. in the shape of streams of the most vivid lightning, with deafening thunder, rain, and hail, the ship being driven before the storm, with remarkably high seas, which threatened to poop her. At 5 p.m. what appeared to be an immense ball of fire covered the main-top-gallant mast, whence it seemed to run up the royal pole and explode into the air with a most terrific concussion, covering all the surrounding space with bright sparks of electrical light, which seemed to be driven rapidly to leeward by the wind. At 5.15 the ship was struck a second time on the mainmast by an apparently immense mass of lightning, and the foretopsail was lowered before the violent gust of wind with which this second shock was attended. At 5.30 another very heavy discharge of lightning fell on the mainmast, and from this time till 6 p.m. the ship was completely enveloped in sharp forked lightning, accompanied with incessant peals of thunder. At 8.10 they sheeted home the maintopsail, and at 9.30 set the foresail; a confused sea with long heavy rollers from the W.N.W., followed this terrible display of atmospheric electricity. On the next day the ship's course was altered, and the masts and rigging carefully overhauled, but no injury was found to have been sustained to either, nor do any of the men either below or aloft appear to have been hurt in the least. The permanent system of fixed lightning conductors, invented by Sir W. Snow Harris, and now universally employed in Her Majesty's ships, most effectually protected both ship and crew. It need hardly be mentioned that, without these conductors, this magnificent frigate would have been partially or wholly destroyed in such a storm.

ON THE PHÆNOMENON OF TWO TIDES A-DAY.

(A Study.)

BY GENERAL T. PERRONET THOMPSON, M.P.

To the Editors of the Mechanics' Magazine.

Gentlemen,—"A. B." desires to be informed how the moon's attraction can be the cause of tides, when, instead of there being high water once a-day when the moon is on this side of the earth, it is high water again when she is directly the contrary. Still more, how the sun and moon can be the cause of a spring tide at full moon when they are on opposite sides. And he thinks all this absurd and visibly contrary to reason.

There is danger in rashly voting things absurd; inasmuch as causes often lie deeper than a first view. The best instance, perhaps, would be in supposing some philosopher of the desert, who never saw water except in a well, saying, "As to the notion that a wind blowing from north to south can be the means of causing a ship to move from south to north, it is clearly absurd, and beneath the dignity of human nature to entertain." Yet we know the thing is done every minute in the day.

In the case of tides the difficulty is increased by the original explanation having been given in a learned language, and not elucidated by the copiers and commentators with all the clearness which might be desired.

The first step is in Newton's celebrated proposition, known as the "Problem of the Three Bodies." He supposes a stationary central body, which shall be called No. 1, and another revolving round it, No. 2; the attractive force varying always inversely as the square of the distance, and the direction and velocity of No. 2 such as to make it revolve in a circle round No. 1.

In this state of things imagine a third body, No. 3, to be called into existence; and it shall be supposed exterior to the orbit of No. 2, and, for simplicity, to be stationary. What will be the effect of the

attraction of this new agent? Will it affect or alter the circular motion of No. 2 round No. 1; and if so, in what manner? Newton submits that the effect will be to elongate the previously circular path of No. 2, both on the side next the interloping No. 3, *and on the side opposite*. Here, then, is fairly introduced the principle which shocks "A. B." of the double protuberance. And now for the reasons.

Newton traces the fact to the attraction varying inversely as the square of the distance, and consequently being less at the greater distance. In consequence of this, he says, the attraction on No. 2, when it is *nearest* to the interloper No. 3, is greater than on the central body No. 1, and therefore the distance between No. 2 and No. 1 will be increased. And when No. 2 is *furthest* from No. 3 the attraction on the central body is greater than on No. 2, and, therefore, the distance between No. 1 and No. 2 will be increased also. He shows, too, that by what is called the Resolution of Forces, the operation of thus increasing the distances from the central body will not be confined to the moments when the revolving body is in the straight line passing through the other two, but will be going on in due degree and measure through all the intermediate portions of its course.

This, then, is the place for encountering the difficulty of "A. B." If he were to say, Here is a third attracting body, and it is absurd to suppose its effect can be anything but to cause a protuberance on the side of the orbit next it, and a flatness on the other, he would be met with the rebutter, that he had ignored the facts to which the result is attributed by the opponent. The presentment is, that the result arises from the force of attraction being greater on one body than on another, and consequently their distance being increased. If the force had been at all distances equal, the whole system, central body and all, might have been moved towards the interloping body, and so, as referred to the central body, the circular orbit have been preserved. Or if the force, instead of decreasing, had increased with the increase of distance, the orbit might have been *flattened* on the two sides next and furthest from the interloping body. Both of which speculations have their use in clearing the main fact at issue, which is, that the *diminution* of the force of attraction at increased distances is the cause of the puzzling double protuberance.

Some points connected may usefully be noted, though for simplicity they were kept out of the previous statement. One is, that the revolving body, No. 2, is supposed so small in respect of the central one, and at so great a distance from it, that the fact, undoubtedly true, that the central body will not be absolutely at rest, but its centre be moved round the centre of gravity of the two bodies, may without injury be overlooked. And another, which is connected, and is in truth essential to the explanation of the double protuberance, is that all bodies, great or small, obey to the due extent the attraction of any other, and therefore the central body, No. 1, does in reality yield to the attraction of No. 3, in proportion to its size or other circumstances, at the same time that No. 2 does; the consequence of which is, that No. 2 being attracted more than No. 1 when No. 2 is on one side, and No. 1 more than No. 2 when No. 2 is on the other, the distance of No. 2 and No. 1 is *in both cases* increased.

The next step is to a globe surrounded with water and exposed to the attraction of another body. And here, perhaps, misapprehension has arisen from Newton's declaration that the Problem of the Three Bodies was applicable. Few readers are free from the idea that circular motion is in some way concerned (as, for instance, that the diurnal rotation of the earth has something to do with the double protuberance, and that it is the consequence of the particles of water being engaged in a revolution round the earth's centre, like so many planets round a central body). Whereas, Newton did not mean that the particles of water were planets, but only that the double protuberance arose from the same cause as in the case of the orbit in the Problem of the Three Bodies, namely, the diminished force of the attraction at increased distances.

The way to distinctness, therefore, would appear to be this:—Imagine the earth to have been a central globe, like the sun, but with no rotation of any kind, and to be covered with water. What would be the effect on this globular figure of the creation of the moon? If the past principles are right, it would be to cause a protuberance on the side next the moon, and also on the side opposite; and this for the reason that produces similar alterations in the orbit in the other case—namely, that the attraction on the water nearest the moon is greater than on the centre or central parts, and therefore the distance between them is increased; and the attraction on the centre is greater than on the water furthest from the moon, and therefore the distance between these is increased also.

In all this the great object is to demonstrate why there is a *double* protuberance;

after which, that the earth, by her diurnal rotation, ducks under it and makes what may be called two tides a-day, the moon at the same time progressing round the earth in something like thirty days, and carrying the protuberance along with it, and so lengthening the time between each tide by the sixtieth part of twenty-four hours, will be the simplest of consequences.

Then comes the question of spring and neap tides, which presents the same principle over again in a more complicated form. When the sun, moon, and earth are in the same straight line, there are spring tides—and this whether the sun and moon are on the same side of the earth or the contrary. How is it that the actions of the sun and moon, when they are on contrary sides (which is at full moon), do not tend to neutralize one another with the result of forming a diminished tide instead of an increased? This is "A. B.'s" difficulty.

The solution is in exactly the same place as before. From comparing the difference between the spring and neap tides it is collectible that the effect of the forces operating to produce protuberance may be represented by 9 when they exert themselves together, and 5 when they exert themselves at cross purposes; whence may be inferred that the forces themselves are as 7 to 2—the sun's being least, in consequence of the very small proportion a radius of the earth bears to the distance of the sun. But if these figures are not the right ones, others may be substituted without detriment to the argument. The attraction of the moon on the water next it, is to its attraction at the centre of the earth, as 3,600 to 3,481 (the squares of 60 and 59), and its attraction at the centre is to its attraction on the water most remote, as 3,721 to 3,600 (the squares of 61 and 60), or as 3,481 to 3,368. Hence 3,600, 3,481, and 3,368 may be taken to represent the moon's attractions at the three points, and the differences of these attractions, two and two, may be represented by 119 and 113, being the forces acting *outwards* or *from* the earth's centre, and, therefore, going to form a double protuberance. The attraction of the sun on the water next it, is to its attraction at the centre of the earth (taking the distance of the sun's and earth's centres at 95,000,000 of miles, and the radius of the earth 4,000 miles), as 11,875, to 11,874 (being as the squares of 95,000,000 and 94,996,000); and its attraction at the centre is to its attraction on the water most remote, as 11,876 to 11,875 (being as the squares of 95,004,000 and 95,000,000). Hence, to produce a difference in the sun's attractions which shall be two-sevenths of the difference in the moon's, the absolute attraction of the sun at the earth's centre must be what on the same scale would be represented by 391,875 ($33 \times 11,875$); making differences outwards both ways representable by 33, and going to form a double protuberance, which may coincide or not with the double protuberance produced by the moon, according to the positions of the sun and moon. Where it may be noted, that this large attraction, represented by 391,875, has its fulfilment in confining the earth to its orbit—the differences represented by 33 being what go to form what may be called a *sun's* double protuberance; so that at full moon, or when the sun and moon are opposite, the joint forces acting to produce a double protuberance may be represented by 152 and 146; being the same as they would amount to if the sun and moon were on the same side as they are at new moon. A very curious arithmetical result, and which points to the desirableness of not drawing conclusions at sight. And an interesting exercise is to suppose two equal moons, and see how the force to raise the water is in the aggregate doubled when they are opposite each other.

After this, the neap tides must be referred to the sun and moon acting at right angles to each other. The moon tends to make a double protuberance in one line, and the sun a double protuberance in a line at right angles to it. So that one counteracts the other, and keeps the result nearer to the globular form. Which may be considered as nearly coincident with the effect of forces which, instead of being as 152 and 146, should be as 86 and 80.

There are numerous minor phænomena (for which see Lardner's "Pocket Encyclopædia," Astronomy, pp. 337 and following), such as the *priming* and *lagging* of the tides, with the appearance known as the "establishment" of a port, the effects of the changing declinations of the sun and moon and their varying distances from the earth; as also the tide when the moon is below the horizon being somewhat less than a mean between the one before and the one after. All of which are soluble on the principles advanced; being confirmation strong of general correctness.

If there are errors, the statement of them will tend to correction.

I am, Gentlemen, yours very sincerely,

T. PERRONET THOMPSON.

Eliot Vale, Blackheath, Feb. 24, 1858.

IMPREGNABLE IRON DEFENCES.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—In my first communication, which you did me the favour to place before your readers in No. 1779, it will be recollected that I spoke of the defective construction of epaulments, parapets, and the face of fortifications, which appeared to me capable of improvement; and my first effort in 1829—*nearly* 30 *years since*—was to protect the embrasure with a virtual wrought-iron plate of sufficient thickness to stop a cannon ball from passing into the battery and killing the men at the guns.

Through the plate the muzzle of the gun was pointed, the loop-hole being of an oblong form to allow the gun to be elevated and depressed, and the plate worked horizontally in slots cut in the stone sides of the embrasure, and rested on friction-rollers to admit of the gun being trained with facility; and, on the gun recoiling when fired, a musket-ball-proof plate covered the loophole instantly to prevent the men being picked off by rifles while loading. This was my first improvement of this class, and in succession followed the construction of the face of the works with wrought and cast iron in various ways, ending in the *inclined* principle for *glancing* shot of the largest calibre guns brought against those batteries constructed to render the defence superior to the attack by land or sea; their great object being that of effectually resisting invasion, with which we have been threatened frequently since my recollection. To be in a position to defend ourselves with confidence is a subject well worthy the consideration of the Government, and it would appear the War Department is no longer blind to its necessity; and no country in the world is better prepared than England to defy successful attack by shot-resisting iron impregnable batteries, which we are in a position to carry out to an unlimited extent at home or for the defence of our colonies.

It is admitted by the highest professional authority that I was right in requesting the War Department to test the value of the 4ins. wrought-iron plates by placing them at the angle 40° for *glancing* shot; and at that angle I have every reason to believe the 13ins. solid shot, found to break the plates when placed perpendicular to the line of fire, will glance off without producing serious injury.

It is a notorious fact, England's Government has never been inclined to adopt improvements as promptly as our national interest dictates, and although we might have had impregnable land defences at the date named, and floating iron defences twenty years before the late war with Russia, we refused to have floating iron batteries till FRANCE set the example: and then I was quite in a position to show we carried out the principle very inferior in point of efficiency to the plans I felt so anxious to place at the service of my country.

The daily increasing necessity of being better prepared than we have been is rapidly gaining ground, and the Government has nothing to fear by appropriate expenditure in the construction of iron defences.

Better to keep the enemy out of the country than to drive him back when once landed; the frightful loss of life to effect the latter no real friend to his country can contemplate without feeling prepared to support the Government in effectually preventing it.

My impregnable revolving redoubts, noticed in No. 1800, if mounted as intended, will overmatch the guns of the regular navy, and render it impossible for field artillery to be brought within its range. And when I say my floating iron defences are equally adequate to sustain the object for which they were invented, and that a single gun-boat on the impregnable principle would dispute the pass of a line-of-battle ship within its range, and in many instances sink her with impunity, I say no more than I feel confidence in stating; and surely the great economy of making 10,000*l.* more valuable than 200,000*l.*, merely in the construction of the vessel, is an object in itself of sufficient importance to command the most serious consideration of the country and the Government charged with its protection.

Professional and experienced gentlemen see the advantages of iron for national defences, and iron cannot be well applied for a more valuable object, as *security* gives us confidence commercially; and we are a commercial more than a fighting people, having no vain ambition to exist merely for the sake of fighting unnecessarily.

I remain, Gentlemen, yours, &c.,

JOHN POAD DRAKE.

February 22, 1858.

THE COMING ECLIPSE OF THE SUN.—The *Times* of Wednesday, March 3, contains a long and interesting letter from Mr. Hind, the Astronomer, on the eclipse of the 15th of this month, and its attendant phenomena.

NAUTICAL ASTRONOMICAL INSTRUMENTS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I beg to address you a line upon a letter of General Perronet Thompson's in your number 1795, in which he inquires whether it is practicable to make an instrument, at an expense of about 100*l*., by which the correction of the lunar distances might be performed mechanically with about the same trouble as the distance is corrected with the sextant, &c., &c. From having had an early love for the sea, I have long thought upon these subjects—very imperfectly, no doubt; and I have hesitated to address the Board of Admiralty from having before troubled them with a crotchet of mine to remove or counteract the partial attraction of the iron of ships upon their compasses and chronometers by surrounding or placing the compass or chronometer within cases of iron—thus making the action of the attraction equal. I tried some experiments on the subject at that time, but considered that it required a series of trials only suited to the department and under the direction of the scientific men of the Admiralty. I failed to interest them at the time, and am sorry for it, because I believe it a step towards simplifying the subject.

General Thompson proposes an enlarged celestial globe to measure thereon the arcs. I am not a sufficient mathematician to pronounce an opinion upon its usefulness. What I have proposed is, to me, a very simple instrument to assist in taking observations for a ship's reckoning, and in a great degree mechanically.

I propose the use of a reflecting hemisphere. This hemisphere, correctly made, either of an alloy or of silvered glass, would reflect accurately the sun, moon, or star, giving their heights and distances by inspection. With the degrees engraved correctly around it from the horizon to the zenith, with the assistance of tables, and an extra and moveable arc, everything could be done with this instrument for the finding the longitude and latitude; but, as I have said before, such things can only be made and carried out under the control of the Board of Admiralty, or a department—that of the longitude.

I should feel glad, Gentlemen, if you thought that by giving this publicity it would interest them more than by my private address to consider the subject.

I am, Gentlemen,

Your most obedient servant,

C. PENRHYN ASTON.

Cross-street, Golden-square, W.,
Feb. 22, 1858.

THE MOON'S ATMOSPHERE.

To the Editors of the Mechanics' Magazine.

GENTLEMEN, — Your correspondent, General Thompson, takes exception to my remarks on his letter; but it appears to me that he cannot have read my letter carefully, as, in his last letter, he treats the results I deduced from assuming the theory he propounded to be correct, as though I had quoted his letter *ipsissimis verbis*.

General Thompson's inquiry, "What *is* ether?" reminds me of a similar inquiry attributed to one Mr. Chadband, "What IS *terewlh?*" What ether may be, if it does exist, is quite beside the question, as I made it no part of my exceptions to General Thompson's theory, but merely stated that, if space *were* filled with ether (as, I believe, Sir Isaac Newton and other eminent men contended), it did not require an essay of two pages to prove "that that which exists everywhere exists around the moon."

Your correspondent says that no part of his argument is founded on "*supposition*," as I state. I will quote his own letter:—"It is plain that in an atmosphere, as actually existing, the densities upwards must diminish rapidly from two causes" (which he states)........."BUT, though the densities diminish rapidly, *it is equally certain* that they *never at any assignable distance* become nothing." It appears to me that the latter statement, which your correspondent says "*is equally certain*" with the former one, is by no means so certain as your correspondent assumes it to be, but that, on the contrary, it is a question most debateable; and (as I showed in my last letter), if that supposition were correct, the results which ought to follow are directly opposed to the results of the researches of our most eminent philosophers. If I am wrong in stating this is a mere supposition on the part of your correspondent, he will probably be good enough to correct me by informing me in what part of his letter *this* question is argued. In the meantime, I retain my position—that your correspondent's first letter *assumes* the necessity "of an uniform fluid," or (if your correspondent prefers the term) "a medium" pervading all space.

Your correspondent, it is true, *states* that the densities "*are matter of arithmetical calculation*, and that they never become nothing is the result of that calculation." Your correspondent *supposes* that they are matters of calculation. How does he *prove* it? I contend his supposition is incorrect in fact. As well might it be supposed that, because the bottom of Mont Blanc is slightly more dense than the top of it, Mont Blanc extends to an un-

limited height! Arithmetical calculation would prove the one supposition equally with the other!

In the third paragraph of your correspondent's last letter, he appears even to have forgotten his "supposition:" for in that paragraph, although he does not fix a limit to "distance" (or space), he evidently implies that such a limit may exist! How, then, can an atom of air, or the whole of the atmosphere, be "*perfectly* elastic, AND extend itself to unlimited distances, with *unlimited degrees of rarity*"? I must certainly take exception to your correspondent's definition of the word "*unlimited*," which, according to my dictionary, means, 'not limited, having no bounds, boundess;" and it is evident from other parts of his letter that he uses this word in the sense of "unlimitable." If he does not, will he be good enough to fix the bounds of the distances to which the rarified air extends? Does he not believe in space?

I remain,
Your obedient servant,
J. T.

SODIUM AND POTASSIUM.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—It may be interesting to know that sodium may be fired in the same way as potassium, by the action of (cold) water. The metal potassium, when thrown into water, receives the oxygen on account of its affinity for the same, and liberates the hydrogen (the other element of water); the heat evolved by its union with the former substance being sufficient to set the escaping hydrogen on fire, which burns with a blueish light. The metal sodium, when thrown into (cold) water, acts in the same manner as the afore-mentioned substance, but the heat evolved during the absorption is not sufficient to fire the hydrogen, which, therefore, *escapes* unnoticed. This is a well-known fact.

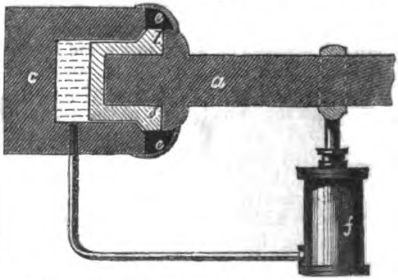
But if we wrap-up the sodium in some cotton-wool the heat by this means is augmented as the oxygen is condensed, and the sodium, being fired, rushes out of the cotton wool, burning upon the surface of the water with a yellow flame. Hence we see that sodium may be fired by its union with water in the same way as potassium. Most works on chemistry deny the possibility of firing sodium by the action of water, I believe. Therefore I solicit the favour of this appearing in your valuable columns to prove the fact.

I am yours, &c.,
A. B. BROWN.

February 22, 1858.

THRUST BEARING FOR SCREW PROPELLERS.

GENTLEMEN,—I beg to send you a plan of a bearing to take the thrust of screw propeller shafts. The object is to diminish



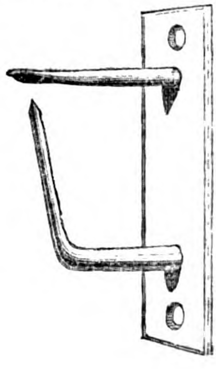
friction and, consequently, wear and tear, and I think with this plan there would scarcely be any at all. *a*, is the propeller shaft, *b* is a brass cap fastened on the shaft end, against shoulders on the shaft. *c*, is a strong cast iron block, bored to admit the brass cap and bevelled, as shown, like a valve. *f*, is a small force pump driven by the same, or any other, shaft. When the propeller is in motion, the pump is constantly forcing water or any other fluid into the block behind the shaft end, and there is no other vent but at the bevelled faces; consequently the water must bear the entire thrust. *e*, is a cover to prevent the water flying off, and to conduct it into vessels, whence it is again pumped into the block.

J. HOPE.

Bishop Auckland, Feb. 27, 1858.

FAULKNER'S REGISTERED PAPER FILE.

Mr. J. FAULKNER, of St. Martin's-le-Grand, London, has registered the paper file represented in the annexed engraving.



The improvement consists in placing a guard above the point of the file, to prevent accidents. The advantage of this is apparent.

THE WAVE-LINE SYSTEM.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I can assure "Nauticus" that I consider my arguments so well-grounded that I have no need to use dexterity or a suppression of candour in combating arguments used in condemnation of the wave-line system.

In dealing with his letter I consider I have treated it fairly, and I am quite willing to leave the matter to your readers' judgment, as he suggests.

Admiral Moorsom sent a paper to the Meeting of the British Association, at Dublin, and one question therein was as to the best angle of entrance at the load water line. My paper answered that question with "No angle whatever;" and I gave good reasons for that answer. If your readers will refer back to my paper, I think they will find that neither this nor any other of its arguments has yet been proved erroneous.

I still think it a great pity that a concavo-convex ship of 2,000 tons should be built in obscurity, and afterwards have a great wooden plaster put upon her, without her form being published. The effect of the plaster will, very likely, cause her to carry rather more weather helm when on the starboard tack than on the larboard tack, and this result would be quite valueless as a scientific fact.

I am, Gentlemen, your obedient servant,

T. MOY.

IMPROVED PATENT FURNACES.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—In your number 1803 is described an improved furnace, patented by an Admiral and an Admiralty engineer conjointly.

Between 1841 and 1843 locomotive and marine boilers came under my consideration, and among my inventions for improving them will be found one in particular, much the same as the one published, and, so far as I can give an opinion, equally simple, and a better generator of heat, and, probably on the whole, less expensive, as it can be kept in working order without difficulty and but little waste of time.

It is not patented, and in a great measure may be considered as invented for the use of the Admiralty, to whom I am well, and have been long, known. As the Admiralty have very properly given great assistance to the patentees of the boiler described, with the hope of improving the public service, can you or any of your readers tell me in which way I can be fortunate enough to obtain the same assistance should I surrender the right of my invention to the Admiralty for the use of the Royal Navy, in the event of its producing better results?

NEPTUNE.

February 28, 1858.

[We can only recommend "Neptune" to submit his invention to the Admiralty in the ordinary manner, and if it meets with no favour, he can then forward it to us, and we will lend him our aid in making it public if we think it deserving of publicity. Even in the case of inventions designed specially for the public service it is, however, well to secure a patent, as the Government have then something tangible to deal with. "Neptune" can hardly expect that every inventor has as strong a claim upon Admiralty assistance as officers of proved skill and experience in their own service. This cannot practically be the case.—EDS. M. M.]

"BIG BEN."

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—As Sir B. Hall is now out of office we shall have a new "First Commissioner of Works." Will this change produce any change in the name of the unfortunate bell? If so, pray suggest, through your valuable journal, a name worthy of the bell that is to deal out the time to the good people of London, and one that will not disgrace a Q. C. founder.

I am, Gentlemen, yours, &c.,

G.

London, Feb. 23d.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

MARTEL, C. *An improvement in fire-arms.* Dated June 4, 1857. (No. 1571.)

This consists, by means of a concealed stop introduced into the lock, and under the exclusive power and control of the owner, in rendering fire-arms safe from being used in any way by any other person.

BLUMBERG, V. *Improvements in the manufacture of billiard-tables.* Dated June 4, 1857. (No. 1572.)

The patentee constructs billiard-tables adapted for use in private houses where no room can be devoted entirely as a billiard-room. He makes the table to fold over as does a draught or bagatelle-board, but differing therefrom by the arrangements necessary to secure the fitting in position.

MILLER, W. *Improvements in the manufacture of sugar, and in the apparatus used therein.* Dated June 4, 1857. (No. 1573.)

The object of part of this invention is to prevent the metal with which the saccharine solutions come in contact being heated above 212° of Fah. The invention also relates to apparatus used in the manufacture of sugar.

BOOTE, T. L., and R. *Improvements in the manufacture of ornamental pottery and articles made from clay and other like plastic materials.* Dated June 4, 1857. (No 1577.)

This consists in certain methods of manufacturing pottery, &c., of different colours.

COLLYER, R. H. *An improved mode of preparing the residue of beetroot, mangel-wurtzel, and other species of the genus betâ left in sugar making and distillation, to be used as material in making paper, papier mâché, millboard, and other similar manufactures.* Dated June 5, 1857. (No. 1578.)

This consists in the preparation of the residue for paper-making material in such a manner that the glutinous, albuminous, gelatinous, and other proteine qualities it contains shall be developed, preserved, and brought into an active state and rendered useful, and in the application and use of the said residue when prepared in combination with other materials to be converted by known modes into paper, papier mâché, mill-board, and other paper manufactures.

ROBERTS, R., W. SHAW, and S. SHAW. *Improvements in machinery for weaving and folding fabrics.* Dated June 5, 1857. (No. 1579.)

This consists in a combination of machinery for raising and lowering the drop-box of a loom requiring two or more shuttles to produce the pattern, by which the shuttles may be brought in any required succession in a line with the shuttle race. 2d, in connecting the weft stop motion of the loom to the Jacquard or pattern chain by which the changes in the position of the drop-box are governed, so as to stop the chain when the weft fails. 3d, in a mode of uniting the links of the Jacquard or pattern chain. 4th, in machinery for throwing the shuttle, commonly called the picking motion, by means whereof the shoulders usually required on the shuttles used in drop-boxes are dispensed with. 5th, in the application of a retaining notch to prevent the drop-box rising or falling when the shuttle fails to enter the shuttle-box; and, lastly, in machinery for folding fabrics, consisting in the application of curved, instead of straight, surfaces for the carriage with the folding instruments to run upon.

NEWTON, W. E. *Improvements in the manufacture of paper, papier mâché, card-board, and other similar articles.* (A communication.) Dated June 5, 1857. (No. 1587.)

This relates to the manufacture of paper from wood. The wood is cut into lengths, carried to the first machine to be rasped into fine filaments, passed through a shute to the next machine, the object of which is to sort the fibres into different degrees of fineness, and to free them from extraneous matters.

MORRIS, J. *Certain improvements in connecting the rails of railways, and in supporting the same.* Dated June 5, 1857. (No. 1588.)

This cannot be described without engravings.

MUSPRATT, E. K., and B. W. GERLAND. *Improvements in treating waste liquors produced in the manufacture of chlorine, and in separating nickel, cobalt, and copper, from liquors containing them in combination with manganese and iron.* Dated June 5, 1857. (No. 1589.)

This is more particularly applicable for the separation of nickel, cobalt, and copper, and oxide of manganese from manganese ores. The ore is brought into solution, and from the solution the patentees separate the iron as peroxide, by means of carbonate of lime, and then filter or decant the solution from the precipitate. The clear liquor, free from iron, contains copper, cobalt, nickel, and manganese, from which the copper can be separated by sulphuretted hydrogen gas, which throws it down as insoluble sulphuret of copper, and nickel, and cobalt, are separated by a partial precipitation, for which the sulphurets are applicable. The patentees use a solution of the impure sulphuret of calcium (soda water) with advantage. This solution is added to the liquor until all the nickel and cobalt is precipitated.

SHAW, T. G. *Improvements in bedsteads.* (A communication.) Dated June 6, 1857. (No. 1590.)

This consists in making a series of light frames or boxes of wood or metal, and sliding one into the other after the manner of a telescope. Each frame or box is covered on its upper surface with canvas, so that when extended it presents a yielding, dry, and comfortable bed, and when closed up resembles a trunk, portmanteau, or knapsack.

POWERS, H. *An improved machine for punching, stamping, or cutting metals and other substances.* Dated June 5, 1857. (No. 1592.)

This cannot be described without engravings.

HUDSON, E. H. *Improvements in means*

or apparatus to prevent driving straps lapping on the shafting when they shift off their pulleys. Dated June 6, 1857. (No. 1594.)

These consist in the application of thin wire rods distended between the supports of the shafting, and applying thereto adjustable hooks, one on each side of each pulley, to receive the strap when from any cause it slips off its pulley, thereby preventing its lapping on the shaft.

EDWARDS, E. *An improved mode of fastening stair-rods and other rods.* Dated June 6, 1857. (No. 1597.)

The sockets for the rods the patentee proposes to make of cast metal of an L form in side view (to fit the angle of the stairs), and with a projection in one end to receive the abutting end of the rod. These sockets are secured by screws to the stairs, and when the rods are inserted he slides over them caps which prevent them rising out of their places.

SHERMAN, A. F. *Improvements in machinery for breaking, hatchelling, roving, spinning, and tarring hemp, flax, manilla, or any fibrous material or materials.* Dated June 6, 1857. (No. 1598.)

The improvement in machinery for breaking the hemp, flax, &c., consists in the use of a small frame with a stationary square shaft, to which one end of the material to be broken is affixed, and a revolving square shaft round which the other end has a turn taken; by the shaft revolving the fibres are broken lengthwise, leaving the ends all tapered. The portion of the machine used for hatchelling consists of a drum with stationary teeth, or moveable "gill bars," having teeth affixed thereto, as a feed cylinder to the hatchell or lapper, and which consists of a large cylinder with stationary teeth or pins on which the hatchelled fibres are wound. The roving is performed by means of a number of rollers placed in front of a gill frame, whereby two leather belts or aprons are driven so that the material passed between them causes every fibre to be drawn evenly from the pins. In the further operation of slivering or roving, the patentee fits the machine with rollers formed from leather in place of wood. The spinning he makes a self-acting operation, by means of a frame with a revolving drum, having stationary pins or teeth on the surfaces with clearers attached to raise the sliver from the teeth; he places grooved rolls in front to draw the fibres from the pins to any required size. He uses a flyer on the front of the rolls to put in the twist, and he attaches thereto a bobbin to wind the yarn upon. To insure the even taking up on to the bobbin, he uses two friction plates, one fixed to the spindle which carries the bobbin, and the other mounted loosely on the same spindle, and he places a friction lever on the front of it to cause it to constantly press against the other friction plate. On the lower end of the friction lever he attaches a spring, which increases the strain as the bobbin fills with yarn. For tarring yarns he uses a revolving nipper whereby the yarn is not strained, and he then carries them round a heated cylinder to assist to dry the yarn after it has been tarred, and secure its being well aired before it is again put on to bobbins. Modifications of the above arrangements are included.

DOPTER, A. J. V. *Improvements in ornamenting cloth, wood, metal, leather, and other surfaces.* Dated June 6, 1857. (No. 1599.)

This consists in printing or impressing colours for painting or ornamenting on cloth, wood, porcelain, enamel, glass, ivory, mother-of-pearl, stones, frescos, parchment, leather, metals, papers, &c. The patentee claims—1. The use of a surface having compartments or recesses furnished with colours or metals in powder, agreeing and registering with a printed adhesive impression, on which such colours are to be sprinkled by a movement given to the whole of such recesses, in order to agitate and deposit the powders on the adhesive matter of the impression. 2. The use of either a stretched skin, cloth, or other fabric, or a surface of any material, which is placed on the assembled colours in the several compartments for transferring them to the impression which is to be coloured by them. 3. The forming a recessed surface for the powdered colours either in wood, metal, skin, fabric, india-rubber, gutta-percha, paste, or other material, either by engraving, casting, wood-engraving, or by soldering or glueing the parts together forming it. 4. The use of layers of powdered colours placed on any material having a plane or cylindrical surface.

BETHUNE, D. *Improvements in apparatus for preventing or consuming smoke in furnaces and chimneys.* Dated June 8, 1857. (No. 1601.)

The patentee, by means of water, regulates the supply of air to the furnaces; he admits the air either at the door or at the back of the bridge, or, when necessary, at both.

BROWN, J. *Certain improvements adapted to the prevention of steam-boiler explosions.* Dated June 8, 1857. (No. 1602.)

This has reefrence to a safety-valve, by

which the patentee proposes to withdraw the steam from below the crown of a boiler, instead of from the top. A steam pipe rises a short distance out of the crown of the boiler, and descends into it about one-half the distance from the crown to the line of full water. A stalk or valve rod passes up through it, and on the top of this rod the valve rests in its seating, upon which any given weight is placed. The stalk or rod almost touches the balance arm of a lever, so that when the water falls and the float with it, the balance arm rises and raises the valve, allowing an escape of steam from the surface of the water.

BROOKS, E. *A new or improved manufacture of gun barrels, and other articles of like manufacture.* Dated June 8, 1857. (No. 1603.)

This consists in the manufacture of gun barrels, &c., from helical coils of iron, raised to a welding heat, and supported on a mandril, the welding being effected by the application of ribbed surfaces, which, being made to operate upon the helix, either by percussion or by pressure, produce a lateral expansion of the coils of the helix, and thereby force the edges of the coils into contact with one another, and effect their welding.

BICKFORD, J. *Improvements in machinery for cutting gutters for irrigating land, and for cutting other surface drains or gutters.* Dated June 8, 1857. (No. 1604.)

The principal features of this machine are two parallel bars, one fixed to cross pieces at both ends, and the other sliding in grooves in the cross pieces, so as to admit of the distances between the bars being increased or diminished. A rack, pinion, and winch serve to adjust the arrangement, and preserve the parallelism. The machine is supported in front by two wheels, and is worked behind by handles. From the bars depend two vertical knives for cutting the sides, and two shares for cutting the bottom of the cutters. The knives are abreast, and are adjusted by screws. The shares follow the knives, and make a horizontal cut at the depth required below the surface. The point of draught is made central.

WRIGHT, W. *Improvements in apparatus for annealing glass in ovens.* Dated June 8, 1857. (No. 1605.)

This relates to a mode of imparting motion to, or of passing the annealing trays from one end of the "lear" to the other, and consists in the employment of a rod passing underneath the trays, and so contrived as to travel to and fro longitudinally, &c.

WRIGHT, W. *Improvements in apparatus for feeding fires and furnaces with fuel.* Dated June 8, 1857. (No. 1606.)

The improved apparatus (which is chiefly applicable to glass furnaces) consists of an archimedean screw within a cylinder, so situated between the outer wall of the cone of a glass furnace and the upper part of the crown, that the coals which are received from a spout into the cylinder at one end may be delivered at the other end through an opening in the crown into the centre of the furnace, by the propulsive action of the screws. This screw may be actuated by a fan placed inside the cone, or any other arrangement. A chain of buckets may be employed to supply a hopper at the upper end of the spouts.

ROBERTSON, J. *Improvements in machinery or apparatus for treating or preparing and boiling rags and other materials.* Dated June 8, 1857. (No. 1607.)

The apparatus consists of a double boiler, the space within the shell forming a steam jacket to the rag holder. The boiling vessel is placed horizontally, and is made with a flange at each end, which rests upon anti-friction wheels actuated by gearing driven from a main shaft. By means of a two-way cock and stuffing-box communicating with pipes steam may be admitted between the vessels, whilst caustic liquor is supplied to the inner vessel. The other end of the vessel is made removeable in order to charge or discharge the boiler. This end (or door) is attached to the boiler by bolts and nuts, and prior to removing it it is slung by a link to a carriage fitted overhead, which travels on rails. The inner vessel is fitted with pins projecting inwards. These serve to break up or agitate the materials under operation.

WHITESMITH, I. and W. *Improvements in weaving.* Dated June 8, 1857. (No. 1608.)

This invention relates chiefly to modifications of and additions to the improvements in weaving for which I. and W. Whitesmith previously made application for British letters patent, but is also available under other circumstances. The first portion relates to the picking action, or the mechanism for actuating the shuttle. The second portion to the shedding motion for the warp, which is obtained from the action of two toothed annular wipers or cams, one attached to each fly-wheel of the loom. The third to a self-operating face lever and weight, by means of which, during the gradual reduction of the diameter of the warp beam, as the warp is drawn off, the face weight is made to move in the same ratio towards the fulcrum of the lever, in

order that the strain upon the warp may be as nearly as possible uniform throughout. The fourth to a peculiar arrangement of brackets, with interposed pieces of caoutchouc, by which means a certain amount of yielding is secured to the warp at each shed as it passes over the ordinary whip roll or back rail of the loom. And the last to a new arrangement for the measuring take up roll, the cloth roll, and the breast beam of the loom.

FONTAINEMOREAU, P. A. L. DE. *Improvements in the construction of axle-bearings.* (A communication.) Dated June 8, 1857. (No. 1611.)

This consists in the application of spheres, or anti-friction balls, to plummer blocks or axle bearings.

BROOMAN, R. A. *Improvements in furnaces.* (A communication.) Dated June 8, 1857. (No. 1613.)

This consists in setting the furnace bars in a frame, the back of which supports the bridge, and in mounting the frame upon trunnions, upon which it may oscillate. The fore end of the frame is connected by a lever to a swing door, which, when closed, shuts the entrance to the ash-pit. After a fresh charge of fuel is put on the fore end of the frame and bars is depressed by a lever, the bridge is thus raised, and touching the roof prevents the passage of any products over it; the lever connected with the ash-pit door also closes the ash-pit, consequently the only entrance for air is between the bottom of the furnace door and the top of the fore end of the inclined frame and bars. The position of the bars admits of the fuel being spread evenly thereon; and the gases evolved pass through the incandescent fuel on the back of the bars. In a short time after coaling, the frame bars and bridge are restored to their horizontal position.

NEWTON, W. E. *An improved life-boat.* (A communication.) Dated June 8, 1857. (No. 1615.)

This consists in a car or boat for receiving goods and passengers, and which is supported upon the elevated prow-shaped ends of two hollow-closed air-tight floats. The car or boat is raised on supports high above the water. Between the parallel floats is placed a paddle-wheel, covered in at top, and driven by manual labour. A rudder mounted in a rudder-frame is also adapted to one end of the vessel, and pumps communicating with the interior of the hollow floats are provided for pumping out any water that may leak into them.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

HARDING, W. *An improvement in pistol-holsters.* Dated June 4, 1857. (No. 1574.)

This consists in combining with the holder a case for cartridges. The inventor attaches to the exterior of the holster, and under the flap thereof, a plate to which a series of metal tubes are fixed side by side. These tubes are made of a size to receive the cartridges, and they have longitudinal slots in them to facilitate the withdrawal of the cartridges.

ROYS, T. W. *Improvements applicable to fire-arms.* Dated June 4, 1857. (No. 1575.)

This consists in forming a chamber in the breech of the piece for inserting any elastic body for receiving the first effect of the explosion.

KING, J. *Improvements in the manufacture of shirts.* Dated June 4, 1857. (No. 1576.)

This relates, 1st, to forming the plaits of shirt fronts, which have no opening in the middle, by folding back the stuff and sewing it up in the form of a tube, which, when flattened, will form a plait. 2d, to the adaptation of two fronts to one shirt body.

ROUSSILLE, E. *Improvements in manufacturing stearic acid.* Dated June 5, 1857. (No. 1580.)

This consists in transforming into soap any fatty material containing stearic acid by means of a super-salt, before submitting it to distillation.

CLAIR, J. E. M. J. *Certain improvements in propelling on water and in the air.* (A communication.) Dated June 5, 1857. (No. 1581.)

This consists in the one of two hollow barrels made tapering towards both ends, and surrounded by screw vanes or threads. The barrels are placed on each side of a vessel or stage carrying a steam-engine or other motor. Rotary motion being communicated to the screw barrels causes them, and the vessel to which they are connected, to advance.

WHEELHOUSE, T., and J. GREENWOOD. *Improvements in ventilating vehicles or carriages in motion.* Dated June 5, 1857. (No. 1582.)

The inventors place a fan under or upon the carriage, and motion is given to it by the wheels. To provide for the outlet or inlet of air from the fan, tubes surround the carriage inside, outside, or both. At each seat they make a hole in the tubes, with a slide to be opened or closed at the will of the person occupying the seat.

SCHMIDT, H. *The new cork roller for lithographic printing.* (A communication.) Dated June 5, 1857. (No. 1583.)

This consists of a wooden roller with a handle at each end. On the roller is placed a thin sheet of cork. Over the cork is rolled a coating of woollen cloth, and the cloth is covered with leather. On the extremities of the roller are screwed brass plates, to maintain the leather in place.

COLLIER, G. *Improvements in preparing printed or parti-coloured yarns for manufacture into fabrics.* Dated June 5, 1857. (No. 1584.)

Difficulty is experienced in preserving the correct register of the colours during the setting for and in the weaving, and the inventor has discovered that this arises from the inequality of the shrinking of the different yarns printed on the same surface, and one part of his improvements consists in submitting all of such yarns printed together in banks to a stretching and drying process, capable of adjustment, as required, in order to stretch and set them to definite lengths. Another of his improvements consists in supporting the bobbins in a stationary frame in place of a moving one, and giving the to and fro motion only to the one pair of clamps, by supporting them on a travelling frame. The next improvement consists in placing the bobbins on horizontal spindles, so arranged that the yarn therefrom is drawn partly round upright rods, upon which it slides freely.

JOSSA, F. *Improvements in uniting iron and steel.* Dated June 5, 1857. (No. 1585.)

This process is based principally on the nature of cast steel, which, possessing greater specific gravity than cast iron, alloys itself with the latter when both are in a liquid state in the points of contact, and thus unites most firmly.

JORDAN, J. *Improvements in the construction of iron ships or vessels.* Dated June 5, 1857. (No. 1586.)

This consists in constructing vessels with a water-tight inner ceiling of iron, extending from the upper to the lower deck, and connecting it with a water-tight lower deck of iron, so as to form a perfectly water-tight chamber within the ribs of the vessel. The hatches are so constructed that they may be packed perfectly water-tight, so that should the lower hold become filled with water by accident, the vessel will be sustained by her buoyancy above the lower deck.

WARD, F. O., and F. WYNAUTS. *Improvements in manufacturing manure and obtaining accessory products.* Dated June 6, 1857. (No. 1591.)

This relates to the treatment of mixed refuse, composed partly of azotised matters (wool, leather, hair, silk, horn), and partly of non-azotised matters (cotton, flax, hemp, oil, metals). The means employed render unnecessary the acid and alkaline disintegrants hitherto employed, and consist principally—1. In the application of an atmosphere of steam for a sufficient time to attack and render friable the azotised matters, without disintegrating the unazotised matters which it is sought to have. 2. In the application conjointly with the above treatment of mechanical means—such as beating, sifting, rubbing, pressure, &c.—to separate the azotised from the unazotised ingredients.

DINGLINGER, R. *Improvements in pumps, which improvements are also applicable to steam engines.* Dated June 6, 1857. (No. 1593.)

The improved pump consists of a cylindrical piston fixed eccentrically upon an axis, and working in a cylinder to which two trunnions are attached. When the piston revolves, it gives the pump barrel a lateral reciprocating motion, causing the ports to come alternately opposite the admission and the discharge passages. The steam engines consist of two cylinders in the same perpendicular axis. Each cylinder is fitted with one piston, and the two may be connected by short pipes or piston rods, which form passages through which the steam is alternately admitted to, and exhausted from, one side of each piston, the other side being open to the atmosphere. When the engine is at work, the cylinders have a lateral reciprocating motion, whilst the pistons move vertically. By providing the two trunnions with pistons and converting their bearings into short steam cylinders, the effect of a pair of coupled engines will be produced.

NOE, H. J. *Improvements in portable stereoscopes.* Dated June 6, 1857. (No. 1595.)

The inventor forms each end piece in two parts, connected by a folding joint, and over the eye-glasses in the upper piece he places a folding piece or jointed lid. The bottom of the instrument is connected to the upper portion of the instrument by an expanding connecting piece, or bellows joint, so that the distance between the pictures and the eye-glasses may be varied by adjusting screws. He also colours the reflecting surface variously to produce different effects. He sometimes affixes the instrument to a case or portfolio, which may be folded over it and fastened by an elastic strap.

ROGERS, J. *Improvements in machinery*

for winding or folding drapery and other like goods. Dated June 6, 1857. (No. 1596.)

This consists in the novel arrangement of a portable machine for winding or folding drapery, &c. Two upright ends are raised on a base, and carry a spindle operated by a winch handle. The base has in front moveable bars or rollers to clip the goods. The end pieces may be hinged to the base, so as to fold down when the spindle is removed. A rotary brush may be added to brush the goods while being wound or folded, and an index affixed to indicate the measurement. The machine may be secured to a counter or table by clamps or screws.

CLARKE, H. *Improvements in rotary engines.* Dated June 6, 1857. (No. 1600.)

This cannot be described without engravings.

TUCK, J. H. *Improvements in the application of light to facilitate operations under water.* Dated June 8, 1857. (No. 1609.)

This consists in certain means of adapting the electric light and gas, and other lights, to operations under water. As respects the electric light, the ordinary battery may be fixed either above the surface of the water, or to, or within, the bell, suitable wires being conducted from the battery to a lantern containing the electrodes. This lantern may be fixed in any suitable position, or it may be portable. As respects gas light, the object is accomplished by a gas burner (supplied from a gas holder) above the water, the light from which burner is thrown by a reflector down through a tube having suitable lenses, or through a simple tube upon the object to be illuminated. Other lights may be used similarly.

KURTZ, C. A., and L. A. NORT. *Improvements in extracting the colouring matter from gum lac and other similar substances, and in treating the residues thereof.* Dated June 8, 1857. (No. 1610.)

Gum lac or stick lac is broken up, and the pieces of wood which it contains removed. It is then reduced to a fine powder. 1lb of this is gradually sifted into 5 pints of water nearly boiling hot, and containing 70 grains of carbonate of soda, and then the water is boiled until the lac is perfectly fused. The liquid is then allowed to repose, and the solution separated from the solid matter, which is removed, and again treated similarly. The solutions thus obtained are mixed, and the undissolved residue is placed on a filter to drain. To precipitate the colouring matter from these solutions the inventors employ a solution of tin. They are then allowed to subside, the clear liquor drawn off, and the deposit or precipitate drained on a filter, and has then the consistence of syrup. The deposit is then mixed with about a third or half of its weight of kaolin or pipe clay moistened with water and pressed through a sieve with the deposit; the paste thus produced is made into cakes and dried. It is prepared for use by dissolving it in boiling water, and then adding cold water, and a slight excess of hydrochloric acid. The material to be dyed is dipped or boiled in this solution. Variations in the tints may be produced by the addition of tartar. The resin or undissolved gum lac remaining from the first part of the operation is also converted into a dyeing solution.

PROVISIONAL PROTECTIONS.

Dated January 20, 1858.

98. Charles and Thomas Davage, steel forgemen, of Wadsley-bridge, Sheffield. Improvements in railway crossings.

Dated January 28, 1858.

152. Peter Bussi, of Milan. An improved railway carriage. A communication from C. Perratone.

Dated February 6, 1858.

223. George Davies, of Serle-street, Lincoln's-inn. Improvements in the preservation of meat and other animal and also vegetable substances. A communication from C. M. G. Magneval, of Lyons.

Dated February 9, 1858.

244. Benjamin Blake Wells, of 431, Strand, and Leadenhall-street, cutler and dressing case manufacturer. Improvements in apparatus for counting and indicating numbers.

Dated February 10, 1858.

249. George John Ping, of Chard, Somerset, mechanic. Improvements in machinery for the manufacture of bobbin net and netted fabrics.

251. William Palmer, of Sutton-street, Clerkenwell. Improvements in lamps.

253. James Nasmyth, of Lille, France, civil engineer. Improvements in the mode of obtaining motive power and of applying it.

Dated February 11, 1858.

254. Austin Chambers, of Canterbury, and William Harrison Champion, of Lynsted, Kent. Improvements in railway breaks.

255. Louis Cass, of Bury, Lancaster, engineer. Improvements in steam engines and steam engine boilers, and in apparatus connected therewith. A communication.

256. Richard Bell, of Gracechurch-street, architect. An improvement in stable pans, sinks, and urinals.

257. George Allam Barrett, William Exall, and Charles James Andrewes, all of Reading, engineers and machinists. An improvement in the manufacture of perforated beaters for thrashing machines.

258. Benjamin Looker, jun., of Kingston-on-Thames. Improvements in sockets for receiving telegraphic and other posts or uprights.

260. George W. Burton, of Dubuque, United States. An improved method of manufacturing white lead. A communication.

261. Joseph Robert Wilkin Atkinson, of Leeds, flax spinner. An improved mode of tightening up and unscrewing binding nuts and screws.

262. William Keatinge, of Merrion-square, Dublin, gentleman. Improvements in correcting variations in the mariner's compass from local attraction.

263. George Thorrington, of Old Windsor, Berks, lighterman. A novel method of propulsion applicable to agricultural purposes.

Dated February 12, 1858.

264. William Newton Wilson, of High Holborn. Improvements in machines for cleaning and polishing knives. A communication.

265. William Newton Wilson, of High Holborn. Improvements in washing and wringing machines. A communication.

266. James Charles Fisher and James Booth, of Blackburn. An improved mode or method of driving mule spindles.

267. James Horsey, of Greek-street, india-rubber manufacturer. An improvement in india-rubber and other elastic band or ring fastenings.

268. James Clifton, of New Oxford-street, manufacturer of perambulators. A new article of nursery furniture or gymnastic exercising chair and support for children. A communication.

269. Thomas Neville, of Lichfield, surveyor, and William Smith Dorsett, of Aldridge, near Walsall, gentleman. Improvements in steam boilers or steam generators, and in steam engines.

270. Thomas Neville, of Lichfield, surveyor, and William Smith Dorsett, of Aldridge, near Walsall, gentleman. A new or improved method of constructing and actuating horizontal water wheels.

271. Alfred Vincent Newton, of Chancery-lane. An improved construction of sewing machine. A communication.

272. Alfred Vincent Newton, of Chancery-lane. Improved machinery for stitching or working button-holes. A communication.

273. William Charles Theodore Schaeffer, of Stanningley, near Leeds. Improvements in obtaining fatty and oily matters from wash waters, or waters containing soap.

274. John Macintosh, of North Bank, Regent's-park. An improvement in treating articles of gutta percha, made or formed in dies or moulds, also certain articles of gutta percha, made by expressing through dies, and also articles of gutta percha, made by pressing rollers.

Dated February 13, 1858.

276. John Emil Ryffel, of Wimbledon, Surrey. Improvement of stoves, for the purpose of warming rooms and baking bread, called the "Hygeian Stove."

277. John Cornish Harcourt Sievier, of Upper Holloway. Improvements in submarine conductors of electric telegraphs.

278. Edward Daniel Johnson, of Wilmington-square, watch-maker. An improved construction of chronometer case.

Dated February 15, 1858.

279. William Spence, of Chancery-lane. Improvements in telegraphic apparatus. A communication from Messrs. Digney Brothers, of Paris.

280. John and Joseph McDermid, both of Middleton-one-row, Darlington. An improved apparatus or contrivance for supplying water to buildings and dwelling-houses for sanitary purposes and for the extinction of fire.

281. Philippe Martin Narcisse Benoit, of Paris, engineer. An improvement in counterbalancing the pressure exerted by the steam against the slide-valves of steam-engines of all kinds.

282. Edmund Hunt, of Walnut Tree Walk, Lambeth, chemist. Improvements in voltaic batteries, and in means for producing the electric light.

283. George Tomlinson Bousfield, of Loughborough-park, Brixton. Improvements in the preparation of dough, pastry, cake, and other farinaceous articles of food. A communication from J. Perry and E. Fitzgerald, of New York.

285. Joseph Tall, of Blackfriars-road. Improvements in that description of carriages called perambulators.

286. Matthew Crawford, of Elswick Iron Works, Newcastle-on-Tyne. An improvement in the manufacture of furnace bars.

287. George Lindsey Blyth, of Derby-street, Westminster, analytical consulting chemist. An improvement in the manufacture of manure from sewage waters and other fluids containing ammonia or nitrogenous matters.

288. William Cope, of Nottingham, manufacturer. Improvements in the manufacture of fabrics by bobbin net or twist lace machinery.

289. Henry John Sanders and Samuel Thacker, of Nottingham. Improvements in machinery for the manufacture of textile and looped fabrics.

290. William Edward Newton, of Chancery-lane. Improvements in treating certain oils and fats, so as to effect the separation of constituent parts of such oils and fats. A communication.

291. Jeremiah Garnett, of Otley, York, paper manufacturer. An improved manufacture of paper.

Dated February 16, 1858.

293. Henry Wilde, of Manchester, engineer. Improvements in connecting the ends of lightning conductors, and also the ends of submarine electric telegraph cables.

294. William Armitage, of Manchester, manufacturer. Improvements in looms.

295. Thomas Barnabas Daft, of Liverpool, civil engineer. Improvements in instruments for rubbing out pencil marks and for sharpening pencils.

296. Marc Antoine François Mennons, of Rue de l'Echiquier, Paris. Certain improvements in voltaic batteries. A communication.

297. Alfred Vincent Newton, of Chancery-lane. Improved apparatus for laying submarine telegraph cables. A communication.

Dated February 17, 1858.

300. James Edward Boyd, of Hither-green, Lewisham, gentleman. Improvements in lawn and grass mowing machines.

301. George and John Edward Baker, of Birmingham, manufacturers. New or improved machinery for compressing and moulding powders and pastes.

302. Patrick Heyns, of Wades-place, Poplar, cooper. Improvements in wheels and axle-boxes.

303. Robert Varvill, of Manchester, ironmonger. A certain improved apparatus for washing clothes or other articles of wearing apparel.

304. William Riddle, of Stonefield-terrace, Liverpool-road. Improvements in apparatus for binding and fastening bales and other articles.

305. The Honourable William Henry Yelverton, of Whitland Abbey, Carmarthenshire, and Owen Bowen, of Great Queen-street, Westminster, gentleman. An improved manufacture of coke.

PATENT APPLIED FOR WITH COMPLETE SPECIFICATION.

299. Charles Monson, of Connecticut, United States. A new and useful mechanism or apparatus, to be used for supporting one or more gas burners, and conducting gas to such, or for various other useful purposes. Dated Feb. 17, 1858.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," March* 2, 1858.)

2666. J. Schmidt. An improved method of making tyres for railway wheels.
2671. M. Henry. Improved machinery for unmaking rope or cordage. A communication.
2681. G. H. Smith. An improved governor or regulator for steam and other engines.
2683. J. H. Johnson. Improvements in Jacquard machines, and in the cards employed therein. A communication.
2685. I. Storey and J. H. Storey. Improvements in water gauges for steam boilers, and in taps for steam and other fluids.
2689. R. Duke. Improvements in the means of communicating power to ships' pumps.
2690. C. Reeves. Improvements in repeating or revolving fire-arms.
2691. J. Bethell. Improvements in machinery or apparatus for trenching, cutting, digging, and cultivating land.
2704. W. H. H. Akerman. Improvements in organs and similar musical instruments.
2713. C. de Clippèle. Improvements in the manufacture of boots and shoes, harness and driving straps, which improvements are applicable to uniting various materials together, and also for waterproofing.
2718. W. Clarke. Improved means of connecting and working breaks for railway carriages.
2726. H. J. Daniell. Improvements in communicating by signals between the pilot and steersman, and between other parts of vessels by means of dial apparatuses.
2727. J. Addison. Discovering and destroying hydrogen or carburetted hydrogen gas and other gases in coal-mines, dwelling-houses, or other places.
2730. P. A. M. Maury. Improvements in cutting the pile of velvets and other pile fabrics.
2733. G. Shillibeer and G. Giles. Improvements in omnibuses.
2734. J. Sloper. Improved means of, and apparatus for, obtaining motive power for propelling ships or driving machinery.
2740. J. and J. Child. A double-barrelled gun with an elevated rifled tubular rib.
2741. H. Taylor. An improvement in the "cans" employed in connection with machinery for preparing cotton and other fibrous materials for spinning.
2758. W. Shields. Improvements in machinery or apparatus for etching, engraving, and cutting cylinders and other surfaces to be used in printing and embossing.
2762. T. S. Prideaux. Improvements in apparatus for regulating the supply of air to furnaces.
2768. T. Lowe. A new or improved method of feeding screws, blanks, shanks, pins, and other such like articles, to turning, nicking, and worming lathes or machines.
2782. M. F. Isoard. Improvements in producing heat and light.
2814. H. R. Palmer. An improved stamping and endorsing machine.
2978. J. Howard. Improvements in the construction of ploughs.
3000. R. Hazard. Improvements in a self-acting reclining chair or couch.
3053. S. and J. Biggin. Improvements in the construction of the handles of tea and coffee-pots, and other similar articles.
3156. C. Reeves. Improvements in repeating or revolving fire-arms.
3192. J. Clinton. Improvements in the manufacture of wind musical instruments played by the mouth and in mandrils used in such manufacture.
63. J. Stephenson. Improvements in the manufacture of wrought-iron.
89. B. B. Wells. Improvements in ordnance.
127. J. Gordon. Improvements in machinery or apparatus for pulping coffee.
133. J. J. Huber. Improvements in the construction of brooches, bracelets, pins, and other articles of jewelry.
157. T. Armitage. Improvements in elastic fabrics.
185. R. A. Brooman. Improvements in sewing machines. A communication.
236. E. Reader and J. Dewick. Improvements in lace machinery for the manufacture of velvet lace and looped fabrics, and in the fabrics manufactured by such machinery.
272. A. V. Newton. Improved machinery for stitching or working button-holes. A communication.
288. W. Cope. Improvements in the manufacture of fabrics by bobbin net or twist lace machinery.
299. C. Monson. A new and useful mechanism or apparatus, to be used for supporting one or more gas burners, and conducting gas to such, or for various other useful purposes.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

400. John Norton.
402. William Henry Zahn.
408. Victor Joseph Lebel, Jean Fourniol, and Jean Baptiste Remyon.
413. John Scott Russell.
421. Charles Henry Roberts.
422. Thomas Nash, jun.
436. Jesse Brickles, Thomas Thorpe, and Joseph Lillie.
441. George Mackay Miller and John Wakefield.
445. Henry Constantine Jennings.
454. George Mackay Miller.
468. John Coney.
547. Joseph Malcomson, Robert Shaw, and William Horn.

LIST OF SEALED PATENTS.

Sealed February 26th, 1858.

2277. Robert Whittam.
2285. Henry Brinsmead.
2293. George William Lenox.
2296. Ephraim Taylor.
2299. Evan Leigh.
2300. Thomas Hardcastle.
2301. Thomas Welcome Roys.
2303. James Petrie.
2306. Thomas Jackson.
2307. Joseph Richard Atha, William Pearson, and William Spurr.
2311. Louis Moreau.
2319. James Nuttall and Louis Stean.
2327. Peter Armand le Comte de Fontainemoreau.
2328. Spilsbury Butler.
2331. Thomas Goodchild.
2335. Constant Jouffroy Duméry.
2479. Alfred Vincent Newton.
2735. William Clark.

3065. John De Normann and William Thomas Henley.
3100. John Everard Barton.

Sealed March 2d, 1858.

2304. George Frederick Parnell.
2313. Tony Petitjean.
2314. Charles William Ramié.
2320. Uriah Scott.
2322. Richard Johnson.
2338. George Josiah Mackelcan.
2360. William Clark.
2362. James Harrison.
2380. Thomas Waterhouse.
2392. Thomas Archer, jun.
3144. Edwin Maw.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICES TO CORRESPONDENTS.

J. A. D.—Double-action drills are by no means new, and the arrangements proposed by you seem to have no peculiar merit.—The absence of refraction near the moon's surface was noticed in the letter of "J. T.," which appeared in a recent Number. The "Curious Mechanical Paradox" is, we believe, a purely theoretical, not to say fanciful, conception. We cannot afford space for a description of your "Ærostat" at present.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

Errata in last number—

Page 196, first column, third line from top, *for* "bacon" *read* "back."
do. seventh line „ „ "fired" „ "fire."
Page 198, second column, twenty-seventh line „ „ "rote" „ "rate."
Page 199, do. fourth line from bottom „ "both himself „ "both for himself."
first column, third line from bottom, supply the inverted commas after the word "overrated."

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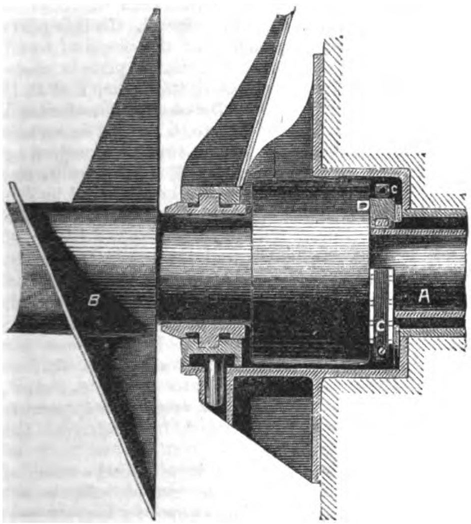
Mechanics' Magazine.

No. 1805.] SATURDAY, MARCH 13, 1858. [Price 3d.

Edited by R. A. Brooman and E. J. Reed, 166, Fleet street, London.

PENN'S PATENT APPARATUS FOR TAKING THE THRUST OF SCREW PROPELLERS.

Fig. 1.



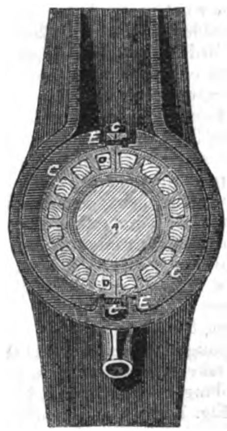


Fig. 2.

Fig. 3.

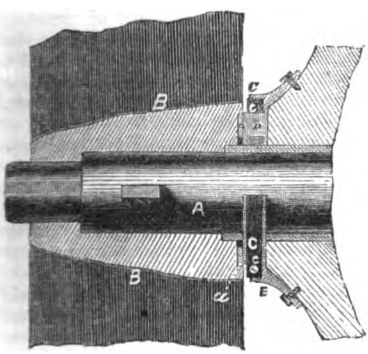


Fig. 4.

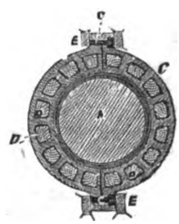
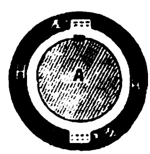


Fig. 7.



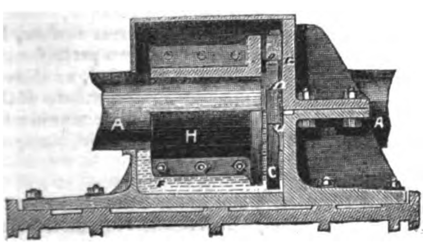


Fig. 5.

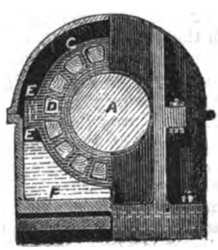


Fig. 6.

PENN'S PATENT APPARATUS FOR TAKING THE THRUST OF SCREW PROPELLERS.

Mr. J. Penn, Engineer, of Greenwich, has patented an improvement in apparatus for taking the thrust of screw propellers, in which the use of bearings of wood, already found so successful in other cases, is applied to the purpose. A disc or plate (by preference made in two parts, so as readily to be fixed and removed) is applied between the boss of the propeller and where the propeller shaft passes into the ship or vessel. In this plate or disc are fixed pieces of hard wood at intervals in such manner that the pieces of wood somewhat protrude beyond the surface of the disc or plate. The disc or plate is made suitable for the propeller shaft to turn freely in an opening through its centre, and it is applied in such manner as to be held from turning with the propeller-shaft. The forward surface of the boss or nave of the propeller, or of a plate fixed thereto, is formed or turned truly, and is, when the propeller is at work, constantly pressed against the projecting surfaces of wood in the plate or disc, which is, as before mentioned, applied where the propeller shaft passes into the vessel. The thrust of the propeller is thus received by the pieces of wood fixed to the plate or disc, and this, being attached to the stern-post of the ship or vessel, transmits to it the thrust of the propeller. The plate or disc and the wood fixed to it, being immersed in the water, will be constantly well lubricated therewith. Although it is preferred to have the pieces of wood applied to a plate or disc capable of being readily removed, this is not essential, and in place of the pieces of wood being applied, as above explained, they may be applied to the boss of the propeller, or to a plate or disc fixed thereto, or to the propeller-shaft, so as to revolve therewith. In which case the pieces of wood, when the propeller is at work, will be pressed against a plate or surface formed or fixed around where the shaft of the propeller passes into the ship. And, although it is preferred that this apparatus should be external of the vessel, like apparatus to take the thrust of a propeller may be applied within the vessel, in which case the rubbing surfaces should be kept well lubricated with water.

Fig. 1 of the engravings on the preceding page shows part of a longitudinal section of the stern of a vessel arranged suitably for having the screw or submerged propeller raised out of the water; Fig. 2 shows a transverse section; Fig. 3 shows part of a longitudinal section; and Fig. 4 a transverse section of an apparatus arranged for an ordinary screw or submerged propeller. Fig. 5 shows a longitudinal section; Fig. 6 a transverse section; and Fig. 7 an end view of an apparatus, when the same is arranged internally of the ship or vessel. In each of these figures the same letters indicate the same parts. When the boss of the screw or submerged propeller is of iron Mr. Penn prefers to apply or affix thereto a ring of brass, *a*, such as is shown in Fig. 3, suitable for working against the wood in the part of the apparatus which takes the thrust. A, is the propeller shaft, which, in Figs. 1 and 2, is at its outer end to be arranged in such manner as to admit of the screw or propeller being separated and lifted, as is well understood, and partly shown in Fig. 1. B, in Figs. 1 and 3, is the boss of the screw or propeller. C, is a plate which, by preference, is made in two parts capable of going together and of being fixed together by screws, *c*, *c*, as shown. This disc or plate has several openings through it, in each of which is fixed a block of hard wood, D. These blocks of wood, D, somewhat project beyond the surface of the plate or disc, C. The plate or disc, C, is prevented turning with the propeller-shaft by means of fixed projections, E, E.

In Figs. 5, 6, and 7, the apparatus is shown to be arranged within the ship or vessel. F, is a trough for containing water, the bottom and also the end, G, of which is made of such a strength as to fit them for the thrust of the propeller. This part of the apparatus is fixed in any convenient position intermediate of the length of the propeller-shaft or shafting. In this arrangement the plate or disc, C, is carried by the fixed plate, G, through which the propeller-shaft passes. The propeller-shaft has affixed to it a brass surface, H, which presses against the blocks of wood, D, D. This surface is made in two parts for the convenience of its being affixed to the propeller-shaft by screws and nuts, *h*, *h*, as shown, or by other convenient means. Or, in place of applying the apparatus intermediate of the length of the propeller-shaft, the apparatus may be constructed in a suitable manner for being applied at the forward or crank-shaft, and so that such end of the shaft may be resisted by a like arrangement of apparatus.

Mr. Penn states that he does not confine himself to the details described, as it will be evident to an engineer that the same may be altered in form and in the mode of construction without departing from the peculiarity of his invention, which consists in constructing

and applying apparatus for taking the thrust of screw and submerged propellers in such manner that wood may be used as described.

There can be no doubt about the advantage of this invention, in so far as the application of wood to the purpose is concerned; but whether it will be ever considered expedient by shipbuilders to receive the thrust of the screw upon the foremost stern-post appears to us doubtful, as it would be likely, we believe, to render the ship leaky at that part. It is, however, quite possible for the structure to be so formed and combined as to avoid this result.

ENGLISH LIGHTHOUSES.

A PAPER on the progress of the English Lighthouse system was read at the Society of Arts, March 3, by A. G. Findlay, Esq., the author of a previous paper, which was printed in the Society's "Transactions" for 1847-8. In the excellent account of the Skerryvore lighthouse, by Alan Stevenson, Esq., which appeared soon after the latter, the main features of the system, as then existing, are detailed. The period which has since elapsed has not been unimportant either in the improvements of lighthouses or their requirements. Before entering into the details of these two branches of the subject, some brief recapitulation of the previous account was given in order to put the Meeting of the 3d inst. in possession of the main facts concerning pharology.

There are two systems of illumination now employed: the older one of lamps with metallic reflectors placed behind the light—the *catoptric*, or, as it may be called, the English system; and the other, where the light is controlled by lenses placed before it—or the *dioptric*, known as the Fresnel or lenticular system, first brought into general use in France. The merit of priority in the former undoubtedly belongs to England. As far as the principle is concerned, the catoptric system was perfect when Captain Huddart determined the best form for the parabolic curve of these reflectors, and his principle is still in use. To clearly understand the action of these reflectors, a reference to the diagram, Fig. 1, will be sufficient. It will be seen that the form of the curve is such that a line or ray from the focus, striking any point of the inner face of the parabola, will do so at the same angle as that of a horizontal ray reflected from that point: therefore, all rays of light so reflected will pass off in a horizontal direction; and, supposing that the light was a single point, the reflector would send forth a cylinder of rays equal in diameter to its double ordinate, or the diameter of its mouth: consequently, it would be impossible to show a light all round the horizon with any number of such instruments; but, as the flame of the lamp is about one inch in diameter, this subtends an angle of 14 deg. 22 min., at the vertex of the parabola, of 4 inches focus (the usual size of lighthouse reflectors); this, with other circumstances, makes it necessary to use from 25 to 33 such reflectors to form a complete zone of light.* The catoptric system is still in use in the majority of our

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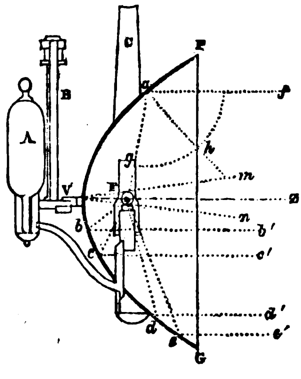
* P, V, G, is a vertical section of a reflector;

Fig. 1.

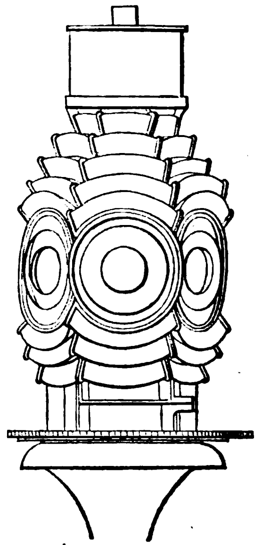


F, the focus and situation of the flame of the lamp; A, the oil fountain; C, the ventilating tube. The angle of incidence being equal to the angle of reflection, the angle, V, a, g, at which the ray, F, g, a, falls on the surface of the parabola at the point, a, is equal to the angle, P, a, f, at which it is reflected from the surface; therefore the angle made by the ray falling on, and being reflected from, the surface, will be bisected or divided into two equal parts by the perpendicular to the tangent of the parabola at the point of incidence; therefore the angle, g, a, f, is bisected by g, h, m—that is, the angle g, a, h, is equal to the angle h, a, f. The peculiar property of the parabolic curve is, that the ray, when reflected from any point, is always thrown in a direction parallel to the axis of the curve; that is, the direction, a, f, of the reflected ray is parallel to the axis, F, Z. Thus, a copper reflector, lined with highly-polished silver, formed to such a curve with a mathematical point of light placed in its focus, as F, will reflect the rays from it in straight lines, parallel with its axis, V, Z, as F, b, b', F, c, c', F, e, e', &c., and thus send forth a cylinder of light whose diameter is equal to the double ordinate of the reflector, P, G.

lighthouses, as it possesses some advantages over the dioptric system.

The dioptric or lenticular system, like that of the reflectors, has arisen step by step to its present condition. The great size which a lens must be to control any great volume of light would require such a mass of material, that many conditions render the ordinary convex lens inapplicable to the purpose. The general plan of the lens as now used was suggested as a good form of burning glass by Buffon, in 1773. For lighthouse purposes the form now applied was first proposed in Britain, by Sir David Brewster, in 1811, who showed that a lens might be built up of separate pieces to any size. In the year 1819, M. Augustin Fresnel, without knowing what Sir David Brewster had done in England, proposed a polyzonal lens of the same character, and afterwards, in conjunction with MM. Arago and Mathieu, applied the system to the Cordouan lighthouse. The new apparatus was first shown on July 23, 1823. M. Augustin Fresnel subsequently made the system much more perfect, and hence it is generally called by his name. The lenticular apparatus is placed around the single central lamp, as shown in Fig. 2. The arrangement of glass is so constructed as to refract the rays emitted from the lamp in the focus of the apparatus in every direction into beams parallel with the

Fig. 2.

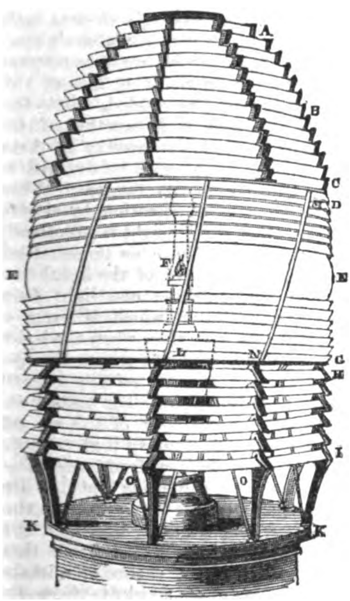


horizon. This apparatus is a holophotal fourth-order lens, showing a revolving light. The oil reservoir is placed over the apparatus, which consists of six polyzonal lenses around the flame of the lamp, above each of which are six portions of catadioptric rings, which are made concentric with the central portion, below which are three central rings. On the revolution of this machine, each face sends forth a flash of nearly the whole light emitted by the lamp. It will be readily understood that, for an instrument of this character to perform its office, many conditions are necessary. First, the glass, which is used in such large masses, must possess perfect homogeneity, it must possess great transparency, and its figure must be formed with great accuracy to ensure successful operation. Its action may be briefly explained as follows, assisted by the illustrative diagram, Fig. 1:—A plano-convex lens of 30 inches diameter, as required in a first-order apparatus, would, if not formed on the polyzonal principle, be above 11 inches in thickness in the middle—a condition manifestly impracticable. The convex surface of the lens is, therefore, supposed to be cut into circular zones of triangular section, so that all the solid portion of the lens is dispensed with; these sectional zones are then arranged on one plane, and have the same refractive properties as if they were one solid piece, because the two surfaces are of the same relative figure. To control that portion of the emitted light which passes over and under the central belt, the plan first adopted by Fresnel was to place a series of small mirrors disposed in tiers above and below the central belt. But, in doing this, there is the great loss caused by the absorption of light by metallic specula, which, perhaps, amounts to one-half of the whole incident light. This consideration led M. Fresnel to construct his small dioptric apparatus, with refracting and totally reflecting glass zones above and below the principal portion. The action of these zones may be familiarized by the use of the ordinary prism, which refracts the incident ray in one direction, and if it receives it on the inner surface of the opposite side at a greater angle than about 41 deg. 49 min., the ray is totally reflected, and ultimately emerges from the prism in a horizontal direction, the only loss of light being caused by the absorption by the glass. The first application of this principle on a large scale is due to the suggestions and calculations of Mr. Alan Stevenson, and it was first introduced in the noble Skerryvore light, which was completed on December 23, 1843, by Mr. François Soleil.

"Nothing can be more beautiful," says Mr. Alan Stevenson, "than an entire appa-

ratus for a fixed light of the first order. It consists of a central belt of refractors, forming a hollow cylinder 6 feet in diameter and 30 inches high; below it are six triangular rings of glass, ranged in a cylindrical form; and above, a crown of thirteen

Fig. 3.



View of a first order *fixed* dioptric light.—F, the focus or flame; L, the lamp; D, E, E, G, the central belt of refractors; M, N, diagonal brass frames to panels of central refractors; H, I, six lower catadioptric zones: A, B, C, thirteen upper catadioptric zones; O, O, diagonal legs; K, K, service table.

rings of glass, forming by their union a hollow cage composed of polished glass, 10 feet high and 6 feet in diameter. I know of no work of art more beautiful or creditable to the boldness, ardour, intelligence, and zeal of the artist."

Such is the general arrangement and operation of the apparatus for a large lighthouse showing a fixed light. For a revolving light, such as the Skerryvore and the Cordouan, a different arrangement is adopted, which, as it is only a modification of those above described, and as most persons are familiar with the fine examples of this apparatus exhibited in our own Exhibition of 1851, and in the later French Exposition, it need not be dwelt on now.

There is an arrangement of the lenticular apparatus which, at the period of Mr. Findlay's former paper, was not in use in our English system, although generally adopted in France and elsewhere. It is for the purpose of showing a fixed light, varied by a flash, preceded and followed by short eclipses (*feu fixe varié par des éclats*). It consists of a supplementary system to the ordinary lenses for a fixed light, distributes its light evenly all around the horizon in a belt equal to the height of the apparatus, increased by its slight powers of vertical divergence. Around this apparatus, consisting of horizontal cylindrical elements, two or four panels of lenses, composed of vertical cylindrical elements, or at right angles to the main apparatus, are made to revolve. The effect of this additional arrangement is to cause those horizontally divergent beams which fall on the inner surface to become parallelised, and thus reach the observer in the form of a flash, which is preceded and followed by a short eclipse, due to the angle between the parallelised and divergent beams. This, though a beautiful arrangement, has some drawbacks in the absorption of the light through the double apparatus. The effect, moreover, is open to other objections. This form of lenticular apparatus has been largely used of late in the new lighthouses constructed by the United States for their coasts.

Of the seventeen dioptric apparatuses which were employed in British lighthouses ten years since, nearly all the glass portions were of French construction. Our shores had at that time been furnished with almost a complete system of lighting and beaconage, and the apparatus of the catoptric class was of the most refined and beautiful description, perfectly fulfilling its office as far as its capabilities would allow it.

Without pursuing this part of the subject into its details, it will suffice here to state that the foregoing embraces the general principles of lighthouse apparatus as in use in 1847. The minor features, in their great variety, may be followed in the excellent works of Mr. Alan Stevenson and M. Fresnel.

In instituting a comparison of the efficiency and economy of the two systems—a question which has been strongly discussed, —many points have to be considered. It has been usual with many to give the superiority, on both heads, to the dioptric system; but there are numerous conditions under which it can be demonstrated that the authorities of our Trinity Board have acted quite wisely in retaining the reflector system, under which so many of our fine lighthouses have been established.

The lamps which are used in these beautiful instruments are all more or less modifications of the cylindrical wicked lamp invented by Argand, in 1783. Those in use for reflectors are the same as they were left by the inventor himself. For the great dioptric lamp, various contrivances have been made for regulating the supply of oil to the compound burner.

After noticing the oils at present used in lighthouse lamps, and certain detail improvements which have been made in the optical apparatuses used, Mr. Findlay said that up to this point we may consider that our lighting is perfect; all future optical improvements can only be introduced on the score of economy, and any increase of power must arise from the source of light. All the powers of our lenses and reflectors aided by the most efficient lamps, are futile against the obscuring effects of haze or rain or snow, and to be able to conquer this difficulty in the least degree will be the greatest step in the lighthouse economy.

The dioptric system does not appear to be adapted for floating lights as at present constructed. Mr. Wilkins and Mr. Letourneau have tried an arrangement of four lenses in front of the four lamps, behind which are spherical reflectors, being, in fact, a species of holophotal apparatus. But the great motion of the vessel prevents the possibility of keeping this apparatus constantly in a vertical position, a condition which is absolutely necessary for its proper action. Our light-ships are, therefore, still furnished with 12-inch reflectors. These, being mounted on gimbals, obey every motion of the ship, and by their great divergence (though consequent loss of light), obviate all those inconveniences which larger instruments would be subject to. But then these lamps and reflectors, up to this time showing a superior light to ordinary lamps, will not bear that comparison with those now used by steam vessels that they did in former years.

The Messrs. Chance, of Birmingham, the well-known glass manufacturers, have successfully competed with our French neighbours in the material as well as in the manufacture of the lighthouse lenses: and their factories are the only place in this country where the operations are carried on to any extent. The fine and important light on Lundy Island, at the entrance of the Bristol Channel, is an example of their construction. It is a first-order holophotal apparatus, showing a revolving light. They are now engaged in making some important apparatus for our Trinity Board. It was believed that the glass could not be made in England so pure in colour, or rather with absence of colour, as to compare advantageously with that made near Paris; but these difficulties Messrs. Chance have overcome, and, although some French material is employed, yet the improved processes have produced a result which compares well with the French apparatus shown in the French Exposition.

After noticing the Drummond light, Mr. Harrison's and M. Duboscq's electric light apparatuses, and Professor Holmes's magneto-electric light (which we have referred to in a separate article at p. 252 of this Number) Mr. Findlay added, that this branch of our subject is worthy of the special attention of the Society of Arts, and an evening might well be devoted to the consideration of its merits. When once the system of illumination by electricity or any other similar light is practically established, we shall have an immense advantage in the capability of the lighthouse system for distinguishing one light from another, a desideratum which is even of more importance now than when the lighthouses were first placed on a proper basis,—in fact this branch of it has remained nearly stationary from its origin. The totally distinct character and colour of the electric light, will at once distinguish it at any distance from that derived from any other source. Therefore, supposing that this illumination be adopted as an adjunct to that in present use, the stations in which it is applied will be distinguished from their neighbours without the chance of mistake, the fruitful source of accidents from the present lights. In its use and in thus economising the power there must be some modification of the optical arrangements now in use. The light, not one quarter of an inch in diameter, would be entirely shut out by the frames of the lenses, or the bars of the light-room. It is probable that some refined arrangement of the Bordier-Marcet apparatus will be found to be the best, a specimen of which is exhibited. The action of the reflector was formerly explained. It was largely used in France, but is only applied to one station in our own country, at Ardvishaig, Scotland. There would be no necessity for a light-room for this light; a simple cylinder of glass, of sufficient diameter, would be the best form of protection, and a revolving wiper would keep the glass clear either within or without. There is one proposition for distinguishing one light from another, which would be readily carried out if it were considered to be desirable, in electric illumination. It is that of the numerical distinction of Mr. Babbage. He proposes that each light should be masked at certain intervals, in such a manner that

the light should tell its own number. Thus, being suddenly eclipsed three times at short intervals, then a pause, then twice suddenly eclipsed for a short period, would indicate No. 32, &c., the numbers to be arranged in a certain order. The simple breaking contact in the magnetic current will produce the eclipsing effect with the greatest facility and certainty.* Lieut. Raper, in his admirable work, proposes another method of showing a light for sea purposes, that is, by illuminating the clouds and haze over the station by the electric light. This shaft of luminosity might be inclined in various directions, or it might be made to revolve in various directions, or it might be made to revolve by proper optical arrangements, and this would give a great relief to the already exhausted resources for varying the appearances of lights; but there is one case which might render this system of no avail, and that is a perfectly pure atmosphere.

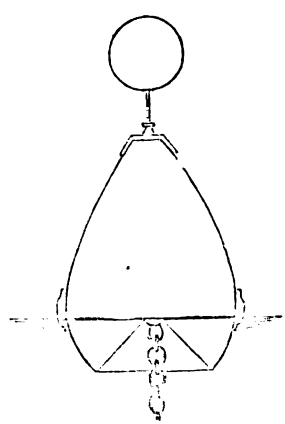
Mr. Findlay next drew special attention to another topic, which has a most important bearing on the subject. It is the question of the lights carried by steam-vessels, which is daily causing more and more confusion in the capabilities of the lighthouse system, and, by diminishing its efficiency, is introducing a fresh element into its requirements.

On Dec. 15, 1847, an order was issued by the Admiralty, that all H.M. steam-vessels should be fitted with a bright light at the mast-head at all times, and, when under steam, to show, in addition, a green light from the starboard-bow, and a red light on the port-bow. On Jan. 1st, 1852, an Act of Parliament came into operation which rendered it imperative on all steam-vessels to adopt the above system, which was also carried out by the Governments of the principal foreign maritime nations. The requirement has led to such improvements in the manufacture of these steamers' lights, that they rival in excellence and brilliancy the lighthouses and light-vessels that are established for their guidance, and constantly are mistaken for the guiding lights on the shore. Many fatal examples might be cited of such an error.

The question of steamers' lights is again under discussion, and a Bill will be brought before Parliament forthwith for its further regulation; but the source of confusion pointed out cannot be obviated, and it demands some consideration, in a primary sense, whether the whole system does not require revision. In the case of the Nore light-ship, the oldest of its kind, it was found necessary to change its fixed light to a revolving light; it could not otherwise be distinguished from the very numerous steamers so frequently at anchor near her, or passing in or out of the Thames. In some cases, a red light has been added to the floating light; but this is ambiguous, as the steamer under way will carry the same appearance.

On a close examination a singular fact presents itself; it is, that *the great majority of wrecks and collisions occur in the immediate vicinity of the lighthouses intended to guard against the dangers around them.* There can be no doubt of this very important fact, and it may be readily accounted for by the universal practice of all ships, as far as possible, sailing along the coasts within sight of the lights, taking a fresh course at each point, when the general trend of the coast changes its direction. The numerous chances of error in a ship's reckoning then place it in constant peril from the proximity of the dangers it is desired to avoid. Many calamities have demonstrated that a mid-channel course, without very great caution, is a hazardous proceeding, especially to inward-bound ships. These disasters would have been averted had any fixed mark certified the commanders of their exact position and courses. It is, then, to floating structures

Fig. 4.



(says Mr. Findlay) we must look for future improvements in pharology. Our light-vessels, as at present constructed, are quite

* An elaborate description of Mr. Babbage's arrangement was given in the 60th volume of the *Mechanics' Magazine*, pp. 315, 363.

incompetent to fill any important station in the system. The desideratum is supplied in the principle proposed by Mr. George Herbert. The conditions required for a floating beacon are, that it should keep upright to be most efficient, and, for a floating light, that it should, in addition to this, be free from any violent oscillation, such as is experienced by ordinary vessels. Mr. Herbert effects this by mooring his beacons, which are of circular plan, from their *centre of gravity*, which is so arranged as to be nearly, or quite, on the line or plane of flotation, as shown at Fig. 4.* Mr. Herbert's buoys were brought into use by the Trinity Board in 1854, and perfectly fulfilled the condition proposed.†

Proceeding higher in the scale of importance, Mr. Herbert proposes a refuge-beacon on the same construction, which may be moored in those places where a conspicuous seamark is imperatively necessary, and where the dangers around it call for some such aid for the shipwrecked mariner.

But the most important application of this excellent principle will be in the establishment of floating lighthouses. If the stability and security of mooring a buoy of this construction be established, there can be no difficulty in extending the principle to any magnitude within the capability of engineering skill, which now overcomes difficulties far greater than that of securely mooring a body of the dimensions required for our purpose. The outline of Mr. Herbert's proposed floating lighthouse, as shown in Fig. 5, is intended to show a light at an elevation of 40 feet, giving a range of 11 miles; or it may be raised to any elevation, say 80 feet, having a proportionately large base, which with the height of the spectator will give a horizon of 27 miles in diameter. The diameter of the base is 45 feet, and the draught of water 11 feet. The displacement is equal to 325 tons. It will be constructed wholly of iron, with all those contrivances now so well understood for insuring very great strength, durability, and power of resistance. The one great essential, that it shall maintain its position, is most carefully provided for. Four chain cables of the largest size and strength will be used, and by laying these in the different directions which experience will show to be those from which the severest strain will come, they will have but little strain in excess of their weight, and whatever that may be, it will only be necessary to compensate for it by diminishing the ballast in the floating base. The action of the waves upon the structure, when moored beyond the reach of the broken water, when the regular swell, however great, passes it, will only be to lift it vertically at regular intervals through a distance proportioned to, but not equal to, their height; thus the strain arising from this source can be readily calculated. It is proposed to use chains three inches in diameter, which it is believed will withstand a strain very many times greater than any to which they can be subjected. These chains pass over a windlass, which, with the central tube or hawse pipe, turns freely as a swivel on the middle of the body, so that the beacon may turn without twisting or fouling its chain. All its parts have been successfully studied, and Mr. Findlay has no doubt of the ultimate success of the proposition. The tower will be of sufficient dimensions to carry the finest dioptric or catoptric light, and in all respects it can be established as efficiently as a structure on shore. The annual cost of maintenance will not exceed that of shore lighthouses.

"With such an addition to our present system of lighting," added Mr. Findlay, "how many difficulties will disappear, and how many advantages may be immediately placed for the furtherance of the progress and certainty of navigation."

The author hoped soon to see this principle of Mr. Herbert's practically added to our resources for navigation. There may be some hope of this, as in a Parliamentary paper just issued the Government authorities think it expedient and desirable that its practicability and efficiency be tested.

Now, as to its application to our lighthouse system. Mr. Herbert proposes to moor a series of these lighthouses in a direct line up the English Channel, and a similar line up the St. George's Channel. The outer light of the former channel will be forty miles south-west of Scilly, on the parallel recommended for vessels to make for the Channel, but from which, when now made, they are compelled to run within the reach of danger, in order to verify their position by sighting the lighthouses. From this point a line of these fabrics should be moored at each degree of longitude up to Dungeness, or eight lighthouses in all for the English Channel. Although their horizons will not, as proposed, overlap each

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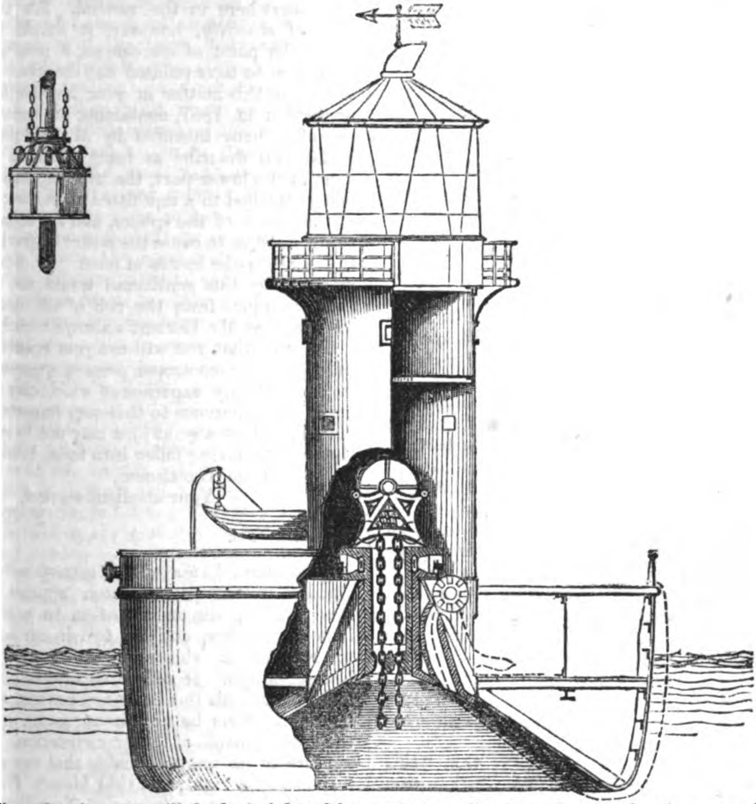
* Mr. Herbert's invention will be found fully described at p. 485 of the 68th volume of the *Mechanics' Magazine*.

† In the river Hooghly, where the stream runs seven knots an hour, these buoys maintained a perfectly upright position, and they are being used to buoy the rapid rivers of Burmah and Siam. All buoys previously used in the Hooghly were carried under water by the force of the stream, their whereabouts being indicated only by a struggling on the surface of the water.

Fig. 5.



other, that is, one will be lost sight of before the other is seen, yet they will be sufficiently near to each other for steam-vessels to steer their course by them with the utmost confidence. The same system applies to the St. George's Channel.

The outermost of the floating lighthouses would communicate by electric telegraph with the shore, and thus any want or announcement would be made instantaneously in the proper quarters, without the long delays now very frequent. Many other advantages might be placed within the reach of windbound vessels by such an establishment.

It is proposed that these lights should be of one exclusive character, differing from the shore lights. Let them all, for example, be fixed, and alter those now fixed to varying lights. Mr. Findlay suggests that the electric light, with its marked distinction, would be admirably adapted to develope the utility of such a system.

Such a line of lights once established, their utility is made manifest in a very few words. Let it be imperative, that all our steam-vessels in going westward pass to the northward of those lights, and those steaming eastward, or up the Channel to the southward of them, leaving them in each case on the port hand. These fairway lights would prove an invaluable acquisition to the mariner and the shipping interest at this period, by relieving the commander from that intense anxiety to avoid collision and danger, the chances of which now inevitably accompany his progress up these crowded channels; and we might then hope to see, in a future record of collision and wreck, a far smaller list of calamities than we now see crowded around our lighthouses. These noble structures in all their utility would still be the safeguard of the coasting-trade, and of all ships not driven by the pressure of the times to sacrifice safety to speed.

HERBERT'S FLOATING BEACONS AND LIGHTS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I find in the *Journal of the Society of Arts*, of March 5, the notice of a paper read before the Society by Mr. Findlay, on English Lighthouses. Speaking of floating beacons, he says that a Mr. George Herbert has answered the conditions required for a floating light, which are, that it should keep upright, and be free from any violent oscillation. This is done, he goes on to say, by mooring the beacons, "which are of a circular plan, from their *centre of gravity*, which is so arranged as to be nearly or quite on the line of flotation." "Such buoys were brought into use by the Trinity Board in 1854, and perfectly fulfilled the condition proposed."

On turning to the *Mechanics' Magazine* for Nov. 24, 1855 (No. 1685), I find an account of a paper read by Mr. Herbert, on the construction of buoys, beacons, &c., in which he says that, with a view of obtaining a stationary floating body which should have a tendency to ride easily, and to retain its perpendicularity, "a wrought-iron pear-shaped buoy was constructed, of a circular form in plan, and terminating above in an apex, so distributing the weight as that the centre of gravity should be situated a little below the centre of the plane of flotation, and the bottom was made concave and raised up internally, so as to form a cone, to the internal apex of which the mooring chain was attached."

The article goes on to say that "this quality of retaining its vertical position arose from the force of the tide or wave being simultaneously exerted upon one side of the exterior of the buoy, and on the opposite side of the interior cone; the forces so nearly balancing each other as to retain the floating body in an almost perpendicular position." Now, Sirs, I do not doubt that buoys constructed in this way would float nearly upright, but I cannot believe that they would do so for the reason assigned above; nor can I think it necessary that the chain should be attached at the centre of gravity. The simple reason why they would retain their perpendicularity I conceive to be that the resultant force of the water against their sides, caused by a tideway or other current, would act through the point of attachment of the chain, not because the buoy was of a circular form in plan, but because it was *accidentally* a spherical surface below the water, as shown by the drawings, and the chain was attached at the centre of that sphere. And, so far as the *equilibrium* was concerned, the centre of gravity may have been anywhere in the vertical. For the sake of *stability*, however, it should be *below* the point of attachment if possible. You seem to have pointed out the secret of success in this matter in your Number for September 12, 1857, containing an engraving of a buoy invented by M. Carvalho, which you describe as being spherical in form at the lower part, the mooring chains being attached to a link fitted at the height of the centre of the sphere, and the ballast so disposed as to cause the centre of gravity to fall below the centre of form. The buoy invented by this gentleman would not be liable to injury from the rub of the mooring chain, as Mr. Herbert's always must be.

Trusting that you will use your scientific influence to have proper persons appointed to conduct any experiment which may be made with reference to this very important matter, so that a good idea may not be lost through its having fallen into feeble hands,

I am, Gentlemen,

Your obedient servant,

N. B.

March 6, 1858.

[The above letter of our correspondent, relating to the paper which appears in this number, directs attention to a very important point, and we feel it our duty to respond to the appeal made in its last paragraph. If official experiments are to be made with the improved beacons and lights, let there be no misconception as to the true principle of their construction. It appears to us unquestionable that our correspondent is right, and that Messrs. Findlay and Herbert are wrong. No scientific reason whatever can be assigned for the proposition which they put forward, viz., that a vessel, circular in plan, and moored at or near its centre of gravity, shall maintain perpendicularity in a stream or tideway; and Mr. Herbert's notion, that the action of the current upon the interior of the cone would tend to this result, is manifestly mistaken; for the very circumstance of the buoy being upright will effectually prevent any such action taking place. At the Meeting of the Society of Arts, Mr. Findlay mentioned the fact that an experimental beacon made on Mr. Herbert's principle had been found in rough weather to oscillate through an angle of 10°—about two-fifths of the angle described by an ordinary beacon. Nothing is more likely than that this amount of oscillation arose in great measure from neglect of the true principle to be observed, which, as "N. B." remarks, was indicated in our description of M. Carvalho's beacon, in September last.

That principle is, that the moorings of the beacon should be attached to it at the height of the point at which the resultant pressure of the stream intersects the vertical axis of the beacon. (Here we, of course, neglect friction.) It is this condition which M. Carvalho fulfils in his beacon. With regard to the entire submersion of buoys by the action of strong currents, as mentioned by Mr. Findlay, we may remark that the only way to remedy the evil is to increase the *displacement* of the buoys. We offer no apology for these comments, as we believe the success of the proposals which Messrs. Findlay and Herbert have so much at heart depends upon the facts to which we here direct attention.—Eds. M. M.]

BRADY'S PATENT ADJUSTABLE SADDLES.

Mr. J. Drumgoole Brady, a gentleman who has introduced several improvements in articles for military equipment, has just completed a patent for improvements in saddles. The invention is intended to apply chiefly to cavalry saddles, or wooden saddle-trees used as such, and its object is to produce an adjustable saddle—that is to say, a saddle which can be made to fit the same horse whether in good or poor condition. Horses, on entering on a campaign, are usually in good condition, but, after a short time, they become poor and thin, and the saddle with which they entered the campaign fails to fit them, comes upon their shoulders and back, and creates sores. Now, in order to remedy this evil without inconvenience or delay, the patentee connects two side trees, or bars of saddle trees, of whatever material formed, both at front and back, by iron or other suitable metal or wooden bow or pommel and back pieces, which are drilled at intervals, say of half-an-inch, to correspond with similar holes formed in each side-tree or bar; screws or other suitable fastenings secure the bows or pommel and back piece to the bars or side-trees at the requisite points. By moving the side-trees or bars to which the pads of the saddle are attached, and fixing them higher up or lower down upon the bows or pommel and back-piece, the same saddle will fit the same horse whether in high or low condition.

Another part of the invention consists in forming the side-trees or bars of skeleton or open-work frames of wood, metal, or other strong material, lined or not, as may be required, with any softer material, such as leather, gutta-percha, or other suitable substance; then, should a sore occur under the frames, portions of the bars thereof, with the parts of the panels attached thereto, could be shifted or removed so as to bring an open part of the frame over the sore, and thus relieve it from pressure and friction.

Fig. 1.

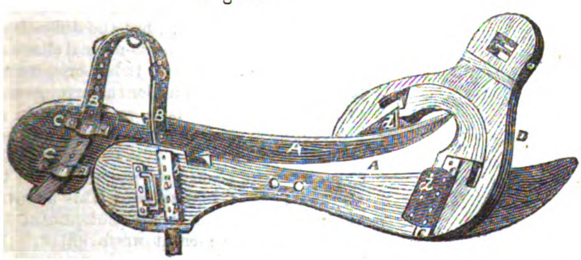


Fig. 2.

Fig. 1 of the annexed engravings is a perspective view of a saddle-tree, showing the manner in which the first part of the invention is carried into effect; A, A, are the side frames or bars; B, the bow or pommel, or front connecting piece, formed in one piece, in metal, or in three parts, as shown in the detached view of the bow or pommel at Fig. 2. The bow or pommel is held to the side-frames or bars by the ends being passed through metal straps, C, C, screwed to the side-frames, and it is secured in any desired position by screws, *a*, passing through holes in a metal plate, *b*, on the frames, and through a hole made in the sides of the bow or pommel. D, is the back connecting piece, up and down which the side-frames or bars are capable of being raised or lowered simultaneously with the front of the frames up and down the bow or pommel, B. *d*, is an angle plate on each frame, with apertures therein, which correspond with other apertures formed in the metal plate, *e*, on each side of the back connecting piece, D. Screws being driven into these apertures secure the frame at the position desired; or the angle plate may be dispensed with, and drilled metal plates may be fitted on the bottom of the piece, D, to correspond with similar plates affixed to the under side of the frames or bars; or the connexion of the parts may

be otherwise effected. In Fig. 2, the bow or pommel is shown, composed of three parts—two side plates and a connecting piece at top; the object being, to allow of the bow being raised and lowered, as well as the side-frames or bars upon the bow or pommel. Apertures in the side plates correspond to others in the connecting piece, and the parts are secured in the position desired by screws.

The improvements in saddles before described are applicable both to riding and to harness saddles.

BROWN'S IMPROVED MACHINERY FOR RAISING AND LOWERING WEIGHTS.

MR. Thomas Brown, of Fenchurch-street, has obtained a patent for the apparatus represented in the annexed engravings, the object of which is to allow cables, &c., to move in opposite directions with different degrees of facility.

Figs. 1 and 2 show two similar arrange-

Fig. 1.

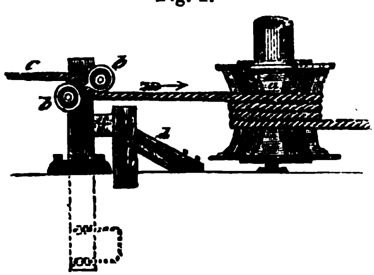
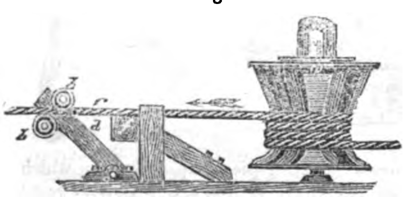


Fig. 2.



ments or combinations of apparatus according to the invention. The ropes in the two cases are shown to be moving in opposite directions, as indicated by the arrows. *a, a*, are the capstan barrels of the form which is preferred ; *b, b*, are pairs of guide pulleys between which the ropes, *c, c*, pass. These pairs of pulleys are carried by uprights, *d, d*, which are capable of inclining in one direction by moving on their axes, *e, e*, when the motion of the ropes is in that direction, but the uprights are prevented inclining in the opposite direction by the stops, *f, f*. In fig. 1 the rope is shown to be moving from left to right, in which case the rope would be unwinding from a drum or barrel to the left of the upright, then around the barrel or capstan, and thence to the weight which is being lowered, and the rope under such circumstances will be bent out of its course by the pair of guide pulleys, and its motion thereby retarded. The rope in fig. 2 is shown to be moving in the opposite direction, and is supposed to be winding on a barrel to the left of the guide rollers, and the right-hand end of the rope is raising a weight, in which case, by the inclination of the upright, the rope is not deflected but is kept in a straight line. The guide pulleys under such circumstances do not tend to retard the passage of the rope between them. The axis of the guide pulleys may be arranged, if desired, so that they may be caused to work nearer to or farther from each other at different times.

THE ELECTRIC LIGHT.

DUBOSCQ'S, HARRISON'S, AND HOLMES' INVENTIONS.

IN his paper on English Lighthouses, read at the Society of Arts on the 3d inst., Mr. Findlay offered some interesting remarks upon recent improvements in obtaining the electric light. Ten years since, he said, hopes were raised that the electric light would be so far perfected by Messrs. Staite and Petrie as to supply this most desirable improvement, but the difficulty in maintaining the light in its normal character led to its abandonment. It has been carried to greater perfection under the arrangement of M. Duboscq, and is in general use in our philosophical experiments, but it requires pelicate management. The principle is that of passing the electric current between two vertical pencils of carbon. This beautiful light, when applied to the holophotal lens apparatus, has a most powerful effect. Mr. C. W. Harrison has made a different arrangement, which obviates the inconvenience of maintaining the exact distance between the two poles, which is the main difficulty in the vertical lantern, by making the positive pole a cylinder of carbon, which, by revolving under the negative point, presents a constantly fresh point to the action of the current, passing in a spiral direction from one end of the carbon cylinder to the other. This is the first time it has been exhibited in public, and certainly it has a very promising commencement.*

* For a fuller description of Mr. Harrison's arrangement see *Mechanics' Magazine* for Dec. 12 1857, No. 1792, Vol. 67.

I hear, continued Mr. Findlay, that the electric light will be shortly established at our finest lighthouse. It is to the talent and patient ingenuity of Professor T. H. Holmes that we shall owe this grand improvement. Mr. Holmes has adopted another form of originating the current than has hitherto been tried—that of *magneto-electricity*. The whole apparatus and its results are an admirable exemplification of the correlation of the physical forces—an evidence that one power may be traced throughout a train of operations until it emanates in a totally different form. The apparatus consists of a series of very powerful permanent magnets, around the poles of which the helices are made to revolve by means of a steam-engine, and from the extent of the primary arrangement a most powerful magnetic current is produced, which, passing through the carbon pencils, shows that splendid light which entirely eclipses all other modes of illumination. The speaker was not aware of the method by which Mr. Holmes regulates the distance between his electrodes, but the light exhibited last year, before the Trinity-house authorities, maintained a perfectly steady appearance for several hours, and doubtless might have been continued for any period. It is intended to show the light from more than one point, so that it may be renovated without eclipsing it altogether, and even this changing of the electrodes is to be effected instantaneously.

CUNNINGHAM'S PATENT FOR REEFING SAILS.

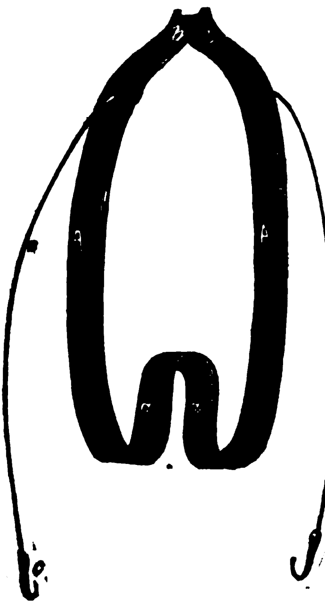
"We beg to draw attention to the circumstance recorded in our advertising columns of the celebrated clipper-ship *Marco Polo*, which has just returned from an Australian voyage, with her main-topsail fitted on Mr. Cunningham's principle for reefing from the deck, now having her fore and mizen-topsail yards fitted,—a most conclusive proof of the value which her commander attaches to this important invention. The fore and main-topsail yards of the *Marco Polo* are 16½ ins. in diameter at the slings, being as large as those of a line-of-battle ship. It appears to us that all our large screw ships-of-war should be fitted with the 'Cunningham topsails,' as, in the event of any sudden outbreak of hostilities, the complete crews of ships already in commission might be distributed amongst a number of ships, and the remainder of the crews made up of artillery soldiers to man these floating batteries. As a very few regular seamen are required to navigate ships fitted on this principle, a large fleet might thus be efficiently prepared for sea with existing means." With reference to the above extract from the *Hampshire Telegraph*, we are glad to observe that the Admiralty have ordered H.M.'s ship *Perseverance* to be fitted with the "Cunningham topsails," which is at least a beginning. If the inventor is so successful with ships of the size of the *Marco Polo* there can be no doubt of the practicability of applying his system to ships of any size in the Royal Navy.

SCOTT'S PATENT CEMENT.

Messrs. W. Lee, Son, and Smith, of Upper Ground-street, Blackfriars, are now manufacturing the improved cement patented by Captain Scott, Royal Engineers, and described at p. 8 of our 66th Volume. The firm mentioned has had it for two years under trial, and now confidently recommends it as most excellent for general use. The patentee is Superintendent of Instruction in Chemistry and other studies at the Royal Engineers' establishment, Chatham, and from him it takes the name of "Scott's Patent Cement." For *internal purposes* this cement possesses many advantages over ordinary lime and hair; it sets with sufficient rapidity to allow the plasterer to follow on with the finishing coat without loss of time; it does not blister, and when applied to a wall never opens in cracks from unequal contraction in drying. It is also admirably adapted for *external purposes*, for when exposed to the atmosphere it enjoys the conditions most favourable to its strength, and it dries to a light buff or stone colour. It is always of one uniform tint, and in this respect it possesses a great advantage over Portland Cement, as compared with which, there is a saving in the material of 30 per cent., whilst it can compete with it in hardness within a short time of its application. Mr. Ferrey, Fellow of the Institute of British Architects, states that he finds no material which answers so well for his process of stamping ornamental patterns on stucco. As a *Mortar* or for *Concrete* it excels the Lias lime in strength, and can be employed at less cost, for it bears a far greater proportion of sand or ballast without injuring its cementitious qualities; and all delay and expense in slacking and screening are avoided. It is also superior to it for hydraulic purposes.

CHESTERMAN'S REGISTERED SPRING HAT-SUSPENDER.

Mr. J. Chesterman, of Sheffield, Manufacturer, has registered the Improved Spring Hat-Suspender represented in the annexed



engraving. A A, is a piece of steel spring, the lower part of which is bent, as shown at *a a*, while the upper parts meet at *b*, when not kept apart by a beam of a railway carriage or other object. B B, are pieces of elastic band, to the ends of which the hooks, *c c*, are attached, and to these the hat is hooked. The purpose of utility arising from the shape of the new part of this design consists in forming the lower part of the suspender of the peculiar shape shown at *a a*, which renders the spring stronger and not so liable to break as those constructed in the ordinary manner.

THE PUBLIC PATENT OFFICE LIBRARY.

We have on several occasions pointed out the necessity that exists for greatly extended accommodation at the public library of the Great Seal Patent Office. Petitions to the Commissioners of Patents are now in course of signature both at the existing library and at the Society of Arts in furtherance of this object. The fact of such petitions being necessary is—the amount of the surplus Patent Fund being considered—a discredit to the late Commissioners, and we strongly hope that the new Commissioners of Lord Derby's Administration, who are all men of unusual vigour and intelligence, will respond with as little delay as possible to the reasonable appeals now made. We assure them the increased accommodation sought is very urgently required.

INSTITUTION OF ENGINEERS IN SCOTLAND.

The Institution of Engineers in Scotland will meet in the Philosophical Society's Hall, George-street, on Wednesday the 17th March, at eight o'clock, evening. The following Papers will be read:—"On Winding Apparatus, including Mine Hoists," by Mr. J. Robertson. "On the Great-West-of-Scotland-Fishery-Company's Steamer," by Mr. J. R. Napier. "On Apprenticeship," by Mr. W. Neilson. "On Employing Steam Expansively," by Mr. A. Morton (continuation of a Paper read at last Meeting). "On the Expansion of Steam in Steam-Engines," by Mr. J. G. Lawrie. "On the Stability of Locomotives," by Mr. J. G. Lawrie.

RIFLE GROOVES.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Can any of your correspondents inform me if Spiral Rifle Grooving is a recent invention, and, if so, where and when it was first introduced in the manufacture of small arms? Also, if the peculiarity and superiority of the Minié rifle to its predecessors consists in the spiral groove and perforated bullet?

An early reply in your valuable magazine will oblige,

Gentlemen, yours respectfully,
John Z. Mitchell.

15, King-street, March 5, 1858.

A QUERY RESPECTING HEAT.

To the Editors of the Mechanics' Magazine.

Gentlemen,—I am a tyro in the science of heat, having only received two short and easy lessons in it. These have sorely puzzled me, and my master has left me in the lurch. My first lesson taught me that to raise a body to a given temperature I must either subject it to friction, or place it in contact with another body of the given or a higher temperature. My second taught me that

steam contains above 1,200 degrees of heat, and yet I can raise steam in a flask immersed in a vessel of fat at the temperature of 300°—where does my steam get all this heat from? My steam has got 1,200° from 300°, and left a remainder.

I am, Gentlemen, yours, &c.,

TYRO.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

MUMBY, G. *Improvements in machinery for sewing, embroidering, and other ornamental work.* Dated June 8, 1857. (No. 1618.)

This relates—1. To embroidering machines. 2. To that class of sewing machines in which a verticle needle is employed in combination with a shuttle, known as Thomas's sewing machine, and consists—1. In embroidering by forming a looped or piled design by means of a needle receiving a compound motion, and in connexion with a supporting wire if necessary. 2. In fixing the embroidering machine to a moveable lever in order to place the embroidering needle in any required position. 3. In attaching braid or trimmings to the fabrics by means of a guide fixed to a shoe, through which guide the braid or trimming passes. 4. In the use of vibrating needles or thread carriers, for producing a braid on a fabric and forming a strong stitch for sewing purposes. 5. In a peculiar shuttle-driver for regulating the throw of the shuttle. 6. In winding thread upon the bobbin by fixing it to the axis of the fly-wheel. 7. In tightening the feed or shuttle thread of sewing machines by a flat or round spring, or by passing it round a wire.

BROWN, J. *An improvement in the manufacture of paper.* Dated June 10, 1857. (No. 1623.)

This consists in incorporating or combining glycerine with pulp from which paper is to be made, or with paper at any stage of its manufacture, or in coating paper with glycerine.

BAILEY, J. S. *Improvements in machinery for combing wool and other fibrous materials.* Dated June 10, 1857. (No. 1624.)

1. The patentee mounts taking-combs on a revolving frame, which take the wool in tufts from a feeding head, and after carrying it round a partial revolution, deliver it to drawing-off rollers, supplied with an endless apron, or other receiving surface, on which an accumulation of tufts is deposited to form a lap or sliver. 2. He causes the taking-combs so to act that they each take a separate tuft from a feeding-head, and so dispose the combs and tufts that a continuous sliver shall be at once drawn off by the drawing-off rollers. 3. He mounts a taking-comb on a frame, which simply performs a partial revolution, and retrogrades at each time, taking a tuft from the feeding head and delivering it to drawing-off rollers.

JARRETT, G. *Improvements in apparatus for printing or endorsing in colours on paper or other surfaces, being improvements upon the invention secured to him by letters patent, dated the 29th July,* 1853. Dated June 10, 1857. (No. 1625.)

This relates to improvements upon an invention patented 29th of July, 1853. The object is to render the working parts of the press (for printing in colours without fluid inks) more compact and durable, and less likely to become injured.

MILLER, M. *Improvements in cocks, taps, or valves.* Dated June 10, 1857. (No. 1626.)

According to one modification of this invention the valvular mechanism consists of a hollow sphere fitted to work in a spherical socket formed upon the pipe or duct. The socket is in two portions, screwed together by flanges after the hollow ball is inserted. A diaphragm of vulcanised caoutchouc is held between the flanges, and lies between the ball and the mouth of the pipe by which the fluid reaches the valve, the fluid having access to the ball by a central aperture in the diaphragm. Perforations are formed in the thickness of the ball at one point, and when the ball is turned so that these coincide with the aperture in the diaphragm the fluid has access to the interior of the ball. When, however, the ball is turned so as to shift the perforations away the passage is closed.

ROBERTS, T. H. *Improvements in the manufacture of casks.* Dated June 10, 1857. (No. 1628.)

These consist, 1st, in the mode of inserting the heads of casks, so as to render the inner surfaces flat, and present less inequalities, and consequent uncertainty of measurement with the gauging-rod, as also to obviate the weakening of the staves by the present system of chiming or grooving; and, 2d, in the method of hooping or trussing casks by introducing within the body of them, whilst unfinished, a suitable stove, fire-place, or flue, for heating and trussing the staves, and preventing their being charred by the open fire at present in use.

SAMPSON, G. and J., and E. LEDGER. *Improvements in means or apparatus for effecting the folding or rigging of woven*

fabrics. Dated June 10, 1857. (No. 1629.)

The fabric to be folded or "rigged" is conducted in contact with the edge formed by the base of two conical surfaces, forming a double conical wheel, between which conical surface and the conical surfaces of other wheels or revolving discs, the two parts of the fabric as folded are conducted to complete the folding.

DUNN, A. *An improvement in preparing and packing tooth-powder.* Dated June 10, 1857. (No. 1630.)

Any preparation of materials suitable for tooth-powder is subjected to pressure in moulds, and then wrapped in tin foil, which will admit of being torn away by degrees, so as to leave the end of the moulded mass uncovered, that it may be rubbed on the tooth-brush.

LEMOINE, E. *Improvements in gas-meters.* Dated June 10, 1857. (No. 1632.)

The object here is to prevent fraud in measuring gas, and to regulate the height of the water in the bent arm or tube by which the gas enters the partitions of the drum. In the lower part of the water compartment is a chamber, into which the surplus water runs, there being a pipe from the chamber to the water level. Another pipe opens at one end into the chamber, and the other end communicates with the inside of the meter, and has an aperture to carry off the surplus water in the bent arm. The outlet opening for the gas is on the forepart of the meter. The water enters the meter by a tube, the lower end of which opens in the water compartment, and the upper end in a reservoir for the feed water.

NEWTON, A, V. *Improvements in reaping machines.* (A communication.) Dated June 10, 1857. (No. 1633.)

This relates, 1, to the application to reaping machines of a cutting device, consisting of rotary cutters mounted on plates connected together by a hinge joint, the plates being provided at their forward edge with fingers, and secured to the main frame of the machine. The cutters are allowed to conform to the inequalities of the ground. 2. To a peculiar raking attachment to be applied to the machine when used as a grain harvester. This device is formed of an endless apron and a moveable bar or rake.

NEWTON, A. V. *Improvements in the construction and mode of propelling and steering navigable vessels.* (A communication.) Dated June 10, 1857. (No. 1634.)

This relates, 1. To the construction of vessels, whether of timber or iron. Their figure in plain view is that of an isosceles triangle, and they are made with vertical sides and a flat bottom. 2. It consists in the expulsion of air from a chamber within the stern of the vessel, through an opening extending the entire width of the stern below the water. 3. It consists in steering such a vessel by means of rudders operating within the air chamber in the stern to give direction to the escaping air.

NEWTON, W. E. *Improvements in printing machinery.* (A communication.) Dated June 10, 1857. (No. 1635.)

This invention cannot be described without engravings.

REMFRY, G. F. *An improved apparatus for supporting, protecting, and propelling the human body in water.* Dated June 11, 1857. (No. 1636.)

This consists, 1. Of an air-tight annular-shaped bag to fit round the neck, having a flat broad edge on its outer circumference, furnished at intervals with eyelet holes, through which is passed a strong cord, to form loops passing beneath the armpits of the wearer. Two cords also tie it round the neck. While uninflated the apparatus may be carried in a coat pocket, and worn as a waterproof cape. The bag is inflated with air by a mouthpiece in the usual manner. 2. To protect the wearer from the waves striking the face, a waterproof cap encloses the mouth and nostrils, held in place by an elastic band. 3. The body being thus supported and protected may be propelled by revolving vanes or screw propellers on the outer end of a spindle, the inner end of which is secured by a loop to the front part of the inflated cushion. A cranked handle gives motion to the propeller.

DALY, D. J. *Improvements in venting casks, and in preserving them from bursting by the action of the liquors contained therein.* Dated June 11, 1857. (No. 1638.)

This relates to the adaptation of a certain self-acting safety valve to casks, whereby, during fermentation of the liquor therein, the carbonic acid gas will be able to find an exit when the pressure becomes too great. This valve will also serve as a vent for casks on draught. The valve is a mitre valve contained in a cylindrical flanged cup or case, which is let into the cask so as to be flush both inside and outside.

ROBERTSON, J. *Improvements in lifting, lowering, transporting, and regulating the motion of heavy bodies.* Dated June 11, 1857. (No. 1639.)

This invention consists of several arrangements of apparatus for effecting the above purposes, which cannot be described without engravings.

CLARK, J. L. *Improvements in appa-*

ratus for conveying letters or parcels between places by the pressure of air and vacuum. Dated June 11, 1857. (No 1641.)

In laying pneumatic pipes difficulty has been experienced in making the joints in the line of pipes so as not to interfere with the passage of the package. To obviate this the patentee makes the joints by causing the ends of the pipes to butt together, and slipping a ring or short tube of vulcanised india-rubber over the joint, and the ends of the pipes are held accurately in their positions by a socket made in two halves connected together with screws, which socket covers the vulcanised india-rubber ring, and clips the ends of the pipes.

PAULE, J. M. *Improved means for ventilating coal and other mines.* Dated June 12, 1857. (No. 1642.)

At the lower part of an upcast shaft is a closed furnace, and above the furnace an enclosed chamber, from which a chimney rises up the shaft. Through the chamber are fixed numerous pipes. The air from the mine is conducted to the enclosed space into which the ends of all the pipes come; hence, as the pipes become heated by the furnace, the air becomes heated, and flows quickly through them, and up the upcast shaft. The furnace is supplied with air by separate air conduits.

WILKINS, W. *Improvements in machinery for the manufacture of looped fabrics.* Dated June 11, 1857. (No. 1643.)

These relate to knitting machines for producing looped fabrics, and consist in using an independent jack lever or hook to act upon the hook or beard or other part of a needle, whereby the needle can be drawn either backward or forward at pleasure. Two needle bars are used, and the needles work in grooves or combs.

WHITWORTH, J. *Improvements in ordnance, fire-arms, and projectiles, and in machinery employed in their manufacture.* Dated June 12, 1857. (No. 1645.)

This cannot be described without engravings.

BUCHANAN, J. *Improvements in the manufacture and finishing of heddles or healds for weaving, parts of which improvements are applicable to the preparing and weaving of fibrous materials.* Dated June 12, 1857. (No. 1646.)

This relates mainly to improvements in the mechanical details of machinery for the manufacture of heddles or healds, for which letters patent were obtained by the patentee, 15th Nov., 1854, and 14th May, 1855.

DAVIES, G. *Improved apparatus for weighing grain and other articles, to be called the electro-magnetic grain-scale.* (A communication.) Dated June 12, 1857. (No. 1649.)

This relates to scales for weighing grain, &c., which will run into, and out from, the scale bin and hopper by their own gravity, and consists principally in attaching valves to the bin and to the hopper of a scale, which valves are operated by an electro-magnet when the requisite amount of grain is in the hopper.

NOAKES, B., and F. J. WOOD. *A method of, and apparatus to be employed in, the sealing of the joints in metallic casks and other similar vessels.* Dated June 12, 1857. (No. 1650.)

This consists in sealing the side joints in metallic casks with metal in a molten state, contained in a vessel fitted with a grating or gauze which is supported at such a distance from the bottom of the bath, and the level of the metal maintained at such a height, that the joint to be sealed shall descend sufficiently into the metal to receive the necessary coating, while a grating or gauze supports the body of the cask. The form of the apparatus employed may be varied.

BRASIER, E. *Improvements in treating flax, hemp, and other vegetable fibres, and in the machinery employed therein.* Dated June 12, 1857. (No. 1651.)

The fibrous material is first laid on a plain feed board, or a self-acting endless band, and conducted between fluted rollers, which rollers press and break the wood of the fibres into very short lengths. In its progress it is then guided through a sort of mouth, then between another pair of fluted rollers, which, beside turning on their axes, have an up and down motion, by which the fibrous material is again pressed and broken, and likewise rubbed against the lips of the aforesaid mouth, which also are fluted from end to end. It is next conducted to another roller with angular ridges along the whole surface, while passing over which it is acted upon by a beater with corresponding ridges, and the material is thus for the third time pressed and broken, and freed from a further portion of the boon. The operation may be repeated by other rollers and beaters. To rid the fibres from the boon more effectually for heckling, &c., two sets of revolving blades, made to rotate rapidly, are placed near the outlet, so as to be easily detached when not required.

D'AMBLY, C. *Improvements in cutting and preparing horn.* (A communication.) Dated June 12, 1857. (No. 1652.)

The horn is soaked and pressed flat while hot in presses heated by steam, and while

hot is cut into plates of the required thickness, by an instrument similar to a plane, having its iron placed horizontally, and in front of the principal cutter or iron are additional cutters, which divide the slice into two or more strips, as required. The strips are piled in a rack or frame, and on the top of each of the piles a metal weight is placed, which squeezes them down flat, and in this form they set when they become cold.

BARSANTI, E., and F. MATTEUCCI. *Improved apparatus for obtaining motive power from gases.* Dated June 12, 1857. (No. 1655.)

This relates to obtaining motive power from the explosive force of a mixture of atmospheric air and hydrogen, or other inflammable gas. The explosion is effected by an electric spark.

LISTER, G. *An improvement in carding-engines.* Dated June 12, 1857. (No. 1657.)

Here, instead of the combs (of single doffer condensers) being carried by arms projecting from an oscillating shaft, the patentee provides for the doffer cylinder two comb plates, mounted upon pairs of rods whose upper ends are connected by an elastic material to some fixed points of the framing, and their lower ends to the cranks of a pair of horizontal shafts, which are rotated by bands from pulleys on the main driving shaft.

MUSHET, R. *Improvements in the manufacture of cast steel.* Dated June 13, 1857. (No. 1660.)

The patentee claims the addition of metallic manganese to cast-steel, excepting only that which is prepared from decarbonised purified cast-iron. He also claims the addition of metallic manganese to bar or wrought-iron, so as to become mixed in the process of manufacture, in order by the union of these substances to obtain an improved quality of cast-steel.

COMINAL, E. *Improvements in printing shawls and other tissues.* Dated June 13, 1857. (No. 1663.)

The methods made use of are based on the principle of folding up the shawls, &c., so as to allow of printing parts of the surfaces of such fabrics at a time, and to obtain the printing of an entire side by two or more successive impressions, and not by printing at once the entire surface.

JONES, T. M. *Improvements in apparatus for cutting and gathering fruit and flowers.* Dated June 13, 1857. (No. 1664.)

This relates, 1st, to apparatus for removing fruit from trees by grasping the fruit by means of an apparatus and pulling it off, so that the fruit is not injured. 2d, to cutting and collecting fruit and flowers, and consists of a pair of cutting shears in combination with a moveable net work, or basket to receive the fruit or flowers when cut.

NEWTON, A. V. *An improvement in the manufacture of sulphuric acid.* (A communication.) Dated June 13, 1857. (No. 1665.)

This relates to the manufacture of sulphuric acid from iron pyrites (sulphuret of iron), and permits also of the obtaining of the oxides of the metal contained in the sulphurets.

HEATON, T. *Improvements in self-acting doors and gateways.* Dated June 15, 1857. (No. 1667.)

This refers to a previous patent of the patentee, and consists in placing horizontal arms or levers at each side of the passage or doorway, one end of each lever turning upon a pivot fixed to a framing, and the other end passing through an aperture in the door, at which part the levers nearly meet, being bent for that purpose. In the apertures there are friction pulleys to allow the ends of the levers to pass easily through them. The doors slide on cross bars, so that when anything comes in contact with the bent levers, pressing laterally against them, the lateral force pushes the ends of the levers and doors sideways into recesses, where they remain as long as anything presses against the levers; but the moment the latter are freed from the said lateral pressure the doors close of themselves, either by pulleys and weights, or otherwise.

VERO, C., and J. EVERITT. *Improvements in the manufacture of hats and other coverings for the head, and in machinery or apparatus to be employed in the said manufacture.* Dated June 15, 1857. (No. 1668.)

The patentees take a body or hat made of wool, and, after having basined it into shape, they take another made of fur or fine wool, and lay the latter upon the former, and basin them together, thus forming a fine surface on a coarse body. The process may be modified.

JOHNSON, J. H. *Improvements in quadrants, sextants, and other similar instruments.* (A communication.) Dated June 15, 1857. (No. 1669.)

This relates to an adaptation of parts to quadrants and sextants, whereby an artificial horizon is obtained for measuring the altitude of the sun, &c., when the real horizon is obscured.

NEWTON, W. E. *Improvements in puddling iron, and in the furnaces and apparatus employed for the purpose.* (A communication.) Dated June 15, 1857. (No. 1671.)

This consists in constructing the puddling furnace with a rotating bottom, which can be constantly revolved during the puddling process, and in conjunction with this a rotating tool is adapted for agitating the heated iron, and exposing it to the atmosphere. The apparatus cannot be described without engravings.

LEVICK, F., jun., and J. JAMES. *An improved construction of hot-blast stove.* Dated June 15, 1857. (No. 1672.)

This refers to a stove or furnace for heating air for blast-furnaces, the object being to render the stove easily susceptible of repair. It cannot be described without engravings.

NEWTON, A. V. *Improved means of registering the performance of railway trains.* (A communication.) Dated June 15, 1857. (No. 1673.)

This consists—1. In the registration of every second of time between the departure of a train and its arrival, by a series of marks produced in lines by a pen or style (under the control of a clock) upon a strip of paper, and the registration upon the said paper of the revolutions of one of the wheels of the train by marks produced in lines parallel with the line of registration of time, by means of pens or styles, by the comparison of which registrations of time and distance the exact rate of the train can at any time be determined. 2. In causing marks of a different character to those produced in running forward to be produced in running backward. By the combination of these two features a system of registration is obtained by which all the circumstances attending the trip of the train are indicated for inspection.

YOUNG, W. *Improvements in lamps and burners.* Dated June 15, 1857. (No. 1675.)

Where cottons or wicks are used, a loose perforated cap is placed over the upper end of the cotton or wick, and the material burned in the lamp, as it is brought up to the cap, is vapourized and burned on the upper surface of the cap, the end of the cotton or wick being protected from being burned. Also, in place of a capillary wick ascending through the burner, and being lighted, each lamp is made with two wicks —one in the burner, and the other brings up the fluid to the wick in the burner.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

NEWTON, W. E. *An improved arrangement or construction of cut-off gear for steam engines.* (A communication.) Dated June 8, 1857. (No. 1614.)

This is intended to be employed in connexion with a governor to govern a steam engine by effecting the cutting off of the steam nearer to the commencement or termination of the stroke of the piston, and it consists in mechanism by which a valve is detached from its lifting gear, so as to permit it to be closed to cut off or shut the further supply of steam to the cylinder by the agency of gravitation, or of a spring, properly applied at any required point in the stroke.

NEWTON, W. E. *An improved construction of faucet or cock.* (A communication.) Dated June 8, 1857. (No. 1616.)

This has for its object the application of a filtering device to a faucet or cock in such a way that the water may be made to pass either through the filtering medium, or not, as desired.

BURDON, J. A. *Certain improvements in apparatus for producing expansion in steam and other motive power engines.* Dated June 8, 1857. (No. 1619.)

Two cams may be employed, formed of three raised cylindrical projections, one being of a spiral shape on its edge, and the others having straight edges. The projections are by a spring brought in contact in succession with a small pulley fixed to an eccentric rod for working the slide valve, in order to cut off the steam at the desired point of the stroke of the valve, the length of which is adjusted by a slotted lever working the cams.

BAXTER, G. *Improvements in printing in colours.* Dated June 8, 1857. (No. 1620.)

This has for its object the production of gradation in the colour applied by each block, in the same way as gradation in tint is now usually obtained in copper or other plate printing, and sometimes also in surface printing where one plate or block produces a complete impression; that is to say, by ruling a series of fine lines on the surface of the block by machinery in those places where a lighter tint is required.

DANIEL, T. *Improvements in drawing frames.* Dated June 9, 1857. (No. 1621.)

This has for its object the prevention of waste cotton being made in case of a lump being passed through the drawing rollers, or in case of the cotton being delivered from the drawing rollers too light, owing to the rollers lapping, or from other causes; or in case the drawn cotton should break down altogether. It is intended to be applied to drawing frames which have self-stopping motions on the feed plate for each

sliver, but might be applied where that is not the case. It consists in fixing the mouthpiece upon a lever having a weight at the end, which weight, when the drawn cotton becomes too light, falls, and overbalances the mouthpiece, and also throws the frame out of gear. Other contrivances are included.

KŒHLER, F. *Improvements in gunpowder.* Dated June 10, 1857. (No. 1622.)

The new gunpowder is formed from—1st, a newly-discovered salt, whose chemical composition is as follows: oxygen, 38·51; chloride, 29·76; kaluim, 31·73; 2d, sulphur; 3d, charcoal. These three substances, powdered very fine, and mixed together, produce instantly a gunpowder without further manufacturing.

GORSE, W., and S. POLLOCK. *New or improved machinery for the manufacture of bricks and other articles of like manufacture.* Dated June 10, 1857. (No. 1627.)

This machinery consists of a wheel turning in a vertical plane, and having on its periphery a series of moulds with moveable bottoms. The clay is delivered from a hopper, and after the mould has been filled the partially-formed brick is subjected to pressure, by a plunger affixed to the end of a lever operated upon directly by a steam piston. The wheel is moved with an intermitting motion, and when the compressed brick has arrived at the lowest point, it is removed by the pressure of the bottom of the mould, and deposited upon an endless web, by which it is removed. The removal of the bricks from the moulds is effected by a series of levers in connexion with a steam piston.

PUDDEFOOT, M. *Improvements in mowing machines.* Dated June 10, 1857. (No. 1631.)

This consists of a circular revolving frame mounted on a vertical axis, which rests on the axis of the wheels carrying the machine. These wheels are within the limits of the circular frame. The upper end of the vertical axis is affixed to the horizontal beam or frame by which the machine is pushed along. The other end of this beam rests on a third wheel, and is furnished with parts whereby motive power may be applied. The revolving frame rests, by means of a boss, on the axis, and this boss is furnished with a toothed wheel, which takes into a corresponding toothed wheel on the running wheels, which thereby impart rotary motion to the revolving frame. The scythes are in form like a reaping hook, are fixed to the lower part of the revolving frame, and extend in a radial direction. Other parts are also included.

FOLSON, A. *Improvements in the construction of tunnels or ways under water.* Dated June 11, 1857. (No. 1637.)

These relate—1. To a method of forming such ways by tubes of cast iron, combined so as to break joint. The connecting ends receive india rubber packing, and there are springs to enable one part to take hold of the other under water, and form a tight connexion till permanent connexions are supplied.

SHAW, J. and H. *Certain improvements in machinery or apparatus for preparing and spinning cotton and other fibrous substances.* Dated June 11, 1857. (No. 1640.)

These relate particularly to "Dyer's frames" or tumbe roving machines, but are also applicable to other machines. The apparatus is designed for imparting pressure and solidity to the roving as it is wound upon the spool or bobbin, and consists in the use of a lever or arm, at the upper end of which is a roller in contact with the material upon the bobbin; the lower end of this arm slides upon a bar, and traverses along the bobbin uniformly with the winding of the roving thereupon, and thereby imparts an even pressure to the roving. The pressure is regulated by an adjustable weight. This pressing roller may also be applied to the presser or presser flyers employed in spinning machinery.

ELCE, J., and S. HARTLEY. *Improvements in machinery for preparing moulds for casting iron or other metals.* Dated June 12, 1857. (No. 1644.)

This consists in the application of eccentrics connected together and acting simultaneously on the upper box, whereby it is gradually raised from the lower box until the mould is free from the pattern, and the steadying pins from the holes in which they fit.

RUTTER, T., and J. BANISTER. *Improvements in umbrellas and parasols.* Dated June 12, 1857. (No. 1647.)

This consists —1. In making the rods of umbrellas and parasols, as well as the runners, of an octagonal or other angular figure, instead of cylindrical. 2. In a method of attaching solid ends to umbrella and parasol rods when made hollow and of metal, by attaching the said ends by brazing or soldering.

DIEULAFAIT, J. C. *An improved method of manufacturing garments, whereby one garment may be changed in form to that of several others.* Dated June 12, 1857. (No. 1648.)

This consists in making garments for ladies or gentlemen, the shape of which may be modified at will, by using buttons, or hooks and eyes, or both, for holding together and concealing certain parts of the garments, and also by adding certain parts.

CARLEMAN, C. G. *Improvements in submerged propellers for propelling vessels.* Dated June 12, 1857. (No. 1658.)

The stern post or hinder part of a ship is made with an opening to receive the propeller. Such opening is larger at the two ends than at the intermediate part, in order that the arms, which are comparatively narrow, may rotate within the narrow portion of the opening, and that the blades, which are wider, may rotate through the larger parts of the openings, &c. The propeller blades are fixed on arms, and at the outer end of each of the blades is fixed at right angles to the blade another blade, which it is preferred should be part of a cylinder.

MACDONALD, M. *Improvements in washing, bleaching, cleansing, and preparing textile fabrics and materials.* Dated June 12, 1857. (No. 1654.)

This relates to a mode of treating textile fabrics and materials by the combined agency of steam, chemical matters, and mechanical action.

BRAZIL, C. *Improvements in looms for weaving.* Dated June 12, 1857. (No. 1656.)

This relates to the taking-up motion, and consists—1st. In the use of the Jacquard for effecting the driving, whereby the same is caused to operate, and the inventor is thus enabled to bring it into, or cause it to remain out of, action at pleasure. 2. He so arranges the taking-up motion that the jacquard is capable of imparting thereto a variable motion, so that at one time the ratchet wheel may be caused to move one tooth, for instance, and at another time a greater number of teeth, as the pattern may require. It also relates to apparatus for raising the shuttle boxes of rising box looms.

KING, J. *Improvements in the manufacture or production of collars, cuffs, and similar articles of ladies' dress.* Dated June 13, 1857. (No. 1661.)

This relates to the manufacture of ornamental collars, cuffs, &c., of ladies' dresses by printing them at one operation, or the fabrics from which they are made, by the agency of printing blocks cut to the shape of the articles.

MARCH, C. *Improvements in obtaining motive power.* Dated June 13, 1857. (No. 1662.)

This is based upon the theory that the sun is the central power of repulsion and attraction, possessing alternated drifts or lines of repulsive and attractive movement, which lines act upon the earth so as to cause the revolution of the latter. The apparatus consists of a vertical first motion shaft carrying a horizontal wheel, round the periphery of which are disposed a set of thirty-two natural magnets, interpolated with corresponding pieces of steel, the whole series being dovetailed into each other to form a complete ring, the whole being held down by a ring of copper plates.

GARTNER, H. *An improved construction of engine for raising and discharging water.* Dated June 13, 1857. (No. 1666.)

The object here (which is effected by a simple construction of engine) is the throwing of a continuous column of water to any required elevation.

SMITH, W. *Improvements in chromo-typographical printing-presses.* (A communication.) Dated June 15, 1857. (No. 1670.)

By means of this press the inventor can print several colours at once in the same form, the press being divided into four compartments, each compartment containing characters, for a different colour.

THOMPSON, E. *Improvements in piano-forte-hammers.* Dated June 15, 1857. (No. 1674.)

The heads of pianoforte-hammers are here formed so that a new point of impact may be presented as the other becomes worn out or defective, until an entire circle is worn out.

OCHIN, C. B. *Improved metallic roofing slates.* Dated June 16, 1857. (No. 1676.)

The slates are made of sheet iron, or any suitable metal, "of every suitable shape, thickness, and size."

HOLMAN, S. *Improvements in force-pumps.* Dated June 16, 1857. (No. 1679.)

The chief object of this invention is to simplify the construction of a force-pump by applying thereto an elastic compound valve in place of the ordinary clack and other valves.

PROVISIONAL PROTECTIONS.

Dated February 10, 1858.

247. George Richardson, of Copenhagen-street, Islington, and William Richardson, of Ranelagh-grove, Pimlico. The construction of three-wheeled carriages, and omnibuses so constructed to be called first-class omnibuses.

Dated February 15, 1858.

284. Pierre Molinari, of Marseilles. An improved composition, to be used externally for preventing sea sickness and illness arising from similar causes.

Dated February 18, 1858.

307. Eugène Cuvelier, of Arras, France. Improvements in steam engines.

309. William Edward Newton, of Chancery-lane. An improved optical instrument, which the inventor denominates a "Tropescope." A communication from G. Caselli, of Florence.

311. John Henry Johnson, of Lincoln's-inn-fields. Improvements in machinery or apparatus for making bolts and rivets. A communication from J. B. Fondu and E. Boin.

313. Harrison Blair, of Kearsley, Lancaster, manufacturing chemist. Certain improvements in the method of recovering the sulphur which has been used in the manufacture of soda ash, and in the apparatus connected therewith.

Dated February 19, 1858.

315. Joseph Beatti, of Lawn-place, South Lambeth, engineer. Improvements in locomotive and other steam engines, parts of which improvements are respectively applicable to other purposes.

317. John Milne Syers, of Liverpool, manufacturing chemist. Improvements in the decomposition of salt, and in the abstracting of metals from their ores.

319. Robert Griffiths, of Mornington-road, Regent's Park, engineer. Improvements in screw propellers, and apparatus for governing engines used to give motion to screw propellers.

321. Thomas Brazenor, sen., and George Brazenor, jun., saddlers and harness makers, of Birmingham. Certain improvements in mill-bands.

323. James Edgar Cook, of Greenock, booking clerk. Improvements in binnacles or apparatus for holding marine compasses.

325. William Clark, of Chancery-lane. Improvements in filtering water, and in apparatus for the same. A communication.

Dated February 20, 1858.

327. Robert Little, of Glasgow, ironmonger. Improvements in machinery or apparatus for washing and mangling.

329. William Thomson, Doctor of Laws, Professor of Natural Philosophy in the University and College of Glasgow. Improvements in testing and working electric telegraphs.

331. Giacomo Gentile, of Queen-street, Cheapside. Improvements in ornamenting lace, netted, knitted, and woven fabrics.

333. Félix Marie Baudouin, of Paris, manufacturer. Improvements in electric telegraph cables.

335. Henry Rey-Rimels, of Brussels. A new process of manufacturing potato meal or fecula.

337. William Clark, of Chancery-lane. An improved rotary engine. A communication.

339. George Catlin, of Brussels, artist. Improvements in the construction and propelling of steamers.

Dated February 22, 1858.

341. George Schaub, of Birmingham, electro metallurgist. A new or improved manufacture of certain kinds of printing type and other printing surfaces.

343. William Cory, jun., of Gordon-place, Gordon-square. An improvement in the manufacture of artificial fuel.

345. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., Editor of the *Mechanics' Magazine* and Patent Agent. An improvement in treating ores of precious metals. A communication.

347. John Potts, of Park-street, Southwark, patten maker. Improvements in machinery for cutting and shaping toothed gearing.

Dated February 23, 1858.

349. Richard Telford, of Birmingham, merchant, and Michael Hope, of the same place, mechanic. Improvements in castors for furniture.

351. William McLennan, of Glasgow, brass founder. Improvements in the manufacture or production of boots, shoes, and other coverings for the feet.

353. Edward Clarence Shepard, of Jermyn-street, St. James, gentleman. An improvement or improvements in depositing metals and metallic alloys by electricity.

355. George Frederick White, of Mark-lane, City, merchant. Improvements in doors and other locks.

357. William Edward Newton, of Chancery-lane. An improved process for producing photographic pictures or designs on the surface of stone or metals, so that impressions may be taken therefrom by the process of lithographic printing. A communication from A. Cutting and L. H. Bradford, of Boston, U. S.

Dated February 24, 1858.

359. Sydney Smith, of Hyson Green Works, near Nottingham. Improvements in apparatus for insuring the correct action of the safety valves of steam boilers.

361. Alexander Hector, of St. Cyrus, Kincardine, gentleman. Improvements in apparatus for taking or catching fish.

363. Charles Girardet, manufacturer, of Vienna. A new moveable shaft bearer, or supporter of coaches.

365. James Petrie, of Rochdale, engineer. Improvements in apparatus for regulating the flow of steam.

367. William Edward Newton, of Chancery-lane. The application to carts or other vehicles of apparatus for weighing the load contained in such vehicles. A communication.

369. Henry Browning, of Clifton-road, Bristol. An improved composition for covering iron and other ships' bottoms and other surfaces.

371. Robert Frederick Miller, of Hammersmith, coach builder. Improvements in omnibuses.

PATENTS APPLIED FOR WITH COMPLETE SPECIFICATIONS.

370. Walter Kittredge Foster, of Maine, United States. An improvement in the manufacture of blades for pencil sharpeners or other articles of like nature. Dated Feb. 24, 1858.

386. Alexis Jean Dessales, of Rue des Enfants Rouges, Paris. Improvements in oil lamps for railway carriages, ships' cabins, and other purposes. Dated Feb. 27, 1858.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," March* 9, 1858.)

2705. F. C. Kirkman. Improvements in machinery for winding and unwinding ropes and cables which is applicable to electric cables for submarine purposes.
2706. A. V. Newton. An improvement in the process of making wrought iron beams or girders. A communication.
2707. J. Macintosh. Improvements in the construction and laying of telegraph cables.
2711. J. Fairclough, J. Fairclough, and J. Cowan. Improvements for suspending and working window-hangings and other drapery curtains.
2720. T. Mottram. Improvements in knife handles.
2729. W. Smith. Improvements in couplings or connections for shafts. A communication.
2743. R. A. Ronald. Improvements in the manufacture of shawls.
2744. W. Greening. Improvements in enamelling and ornamenting metals and other surfaces.
2746. D. de la Cherois Gourley. Improvements in ambulance carriages.
2750. W. Padgett. The manufacture of earthenware pipes for drains and sewers.
2752. E. Smith. An improved safety hook or fastening, particularly applicable to securing watch chains and watches to waistcoats and other garments.
2756. H. Charlesworth. Improvements in machinery or apparatus for preparing woollen or other fibrous substances to be spun.
2759. W. Harwood. Improvements in reaping machines.
2764. M. Stodart. An improvement in the construction of the sound boards of pianofortes.
2765. G. B. Galloway. Improvements in the construction of merchant ships and other vessels, in motive powers, propulsion, and boiler furnaces.
2770. L. de Landfort. An apparatus for protecting the contents of pockets of wearing apparel from theft and loss.
2771. R. A. Brooman. Improvements in the construction of boats. A communication.
2773. W. Woodhead, J. Woodhead, and J. Woodhead. Improvements in the manufacture of kiln tiles, and in the machinery or apparatus employed therein.
2774. P. Gabbitass. Improvements in washing machines.
2775. P. B. Kyishogloo. Improvements in obtaining and applying motive power.
2781. Charles Iles. Improvements in wardrobes or similar receptacles for articles of dress and in stands, frames, and pins for holding or suspending articles of dress.
2784. J. Apperly and W. Clissold. Improved means of and apparatus for feeding fuel to furnaces.
2785. J. Apperly and W. Clissold. Improvements applicable to carding and condensing engines.
2793. R. Wappenstein. Improvements in doctors or scrapers used for cleaning engraved surfaces.
2794. A. C. Sacré. An improved apparatus for measuring water.
2801. R. I. C. Dubus. A method of treating certain plants or vegetable substances in order to extract from the same, first, a kind of fecula or farina proper both for alimentary and finishing or starching purposes; second, an alcoholic liquor; and third, a natural ferment or yeast.
2817. G. Canouil. Improvements in the manufacture of matches.
2824. J. Adams. Improvements in revolver fire arms.
2845. P. Madden. Improvements in kilns for drying corn, malt, or other granular substances, part of these improvements being applicable to the screening or sifting of such substances during the process of drying.
2854. F. H. F. B. de Sivray. Certain improvements in the construction of bedsteads.
2897. W. Smith. An apparatus for the purpose of protecting the turnip crop, by destroying the turnip fly and other insects which are injurious to turnips and other plants.
2912. T. F. Brabson and G. Hughes. Improvements in door springs.
3196. P. W. Barlow. Improvements in the permanent way of railways.
42. J. A. M. Chaufour. Certain Improvements in the construction of axle boxes and axle bearings.
80. R. A. Brooman. Improvements in machinery for the manufacture of pipes and tubes. A communication.
181. J. Childs. An improvement in the manufacture of the boxes or cases used for night lights.
225. W. Ball. Improvements in the construction of ploughs.
245. R. Carte. Improvements in clarinets.
284. P. Molinari. An improved composition, to be used externally, for preventing sea sickness and illness arising from similar causes.
294. W. Armitage. Improvements in looms.
323. J. E. Cook. Improvements in binnacles or apparatus for holding marine compasses.
329. W. Thomson. Improvements in testing and working electric telegraphs.
351. W. M'Lennan. Improvements in the manufacture or production of boots, shoes, and other coverings for the feet.
370. W. K. Foster. An improvement in the manufacture of blades for pencil sharpeners or other articles of like nature.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

466. William George Henry Taunton.
478. Robert Boby and Thomas Cooper Bridgman.
481. Charles Iles.
486. Andrew Hotchkiss.
488. Arsène Louis Garnier.
489. John Lewis.
504. Joseph Cooper.
505. William Weild.
522. John Norton.
525. Julian Bernard.
529. James Bullough.
562. Henry Davis Pochin.
581. William Lister.

LIST OF SEALED PATENTS.

Sealed March 5th, 1858.

2336. Uriah Scott.
2341. Benjamin Sharpe.
2351. James Eastwood and Samuel Lloyd, jun.
2361. John Dearman Dunnicliff.
2363. William Crofts.
2389. John Walmsley and Thomas Howard.
2409. Edward Hayes.
2428. George Edward Dering.

2431. John Watson Burton.
2435. Montague Richard Leverson.
2439. William Henry Peake.
2486. Michael Henry.
2487. George Speight.
2513. Edwin Thompson and William Joseph Nicholson.
2603. Henry Edwards.
2633. Godfrey Rhodes.
2831. Alphonse René Le Mire de Normandy.
2999. George Tomlinson Bousfield.
3067. Jean Marie Préaud.
3107. Joseph Bennett Howell and John Shortridge.
3137. Alphonse René Le Mire de Normandy.
3173. James Wadsworth.
37. Thomas Greenwood and John Batley.

Sealed March 9th, 1858.

2350. Edward Lavender.
2353. Henry Lawford.
2357. William Jamieson.
2358. James Fenton, William Thomson, jun., and Thomas Snowdon.
2364. Gustav Brunninghaus.
2367. James Mills.
2370. Simeon Colbeck and William Henry Colbeck.
2386. Alexander Gray.
2442. John Minnitt.
3185. Frederick Oldfield Ward.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICE TO CORRESPONDENTS.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

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AN IMPROVED PARMANENT WAY.

Fig. 1.

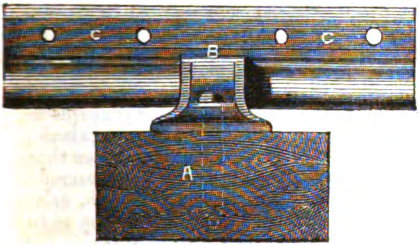
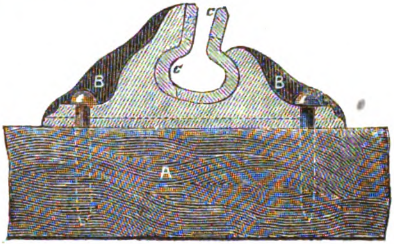


Fig. 2.



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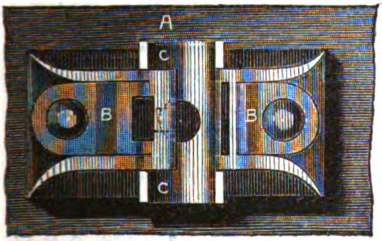


Fig. 3.

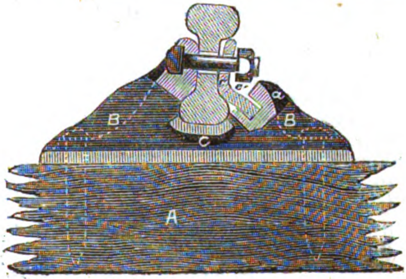


Fig. 5.

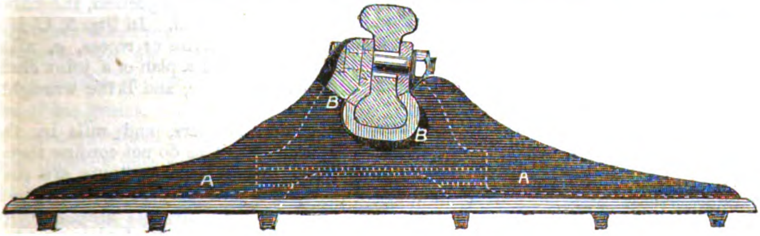
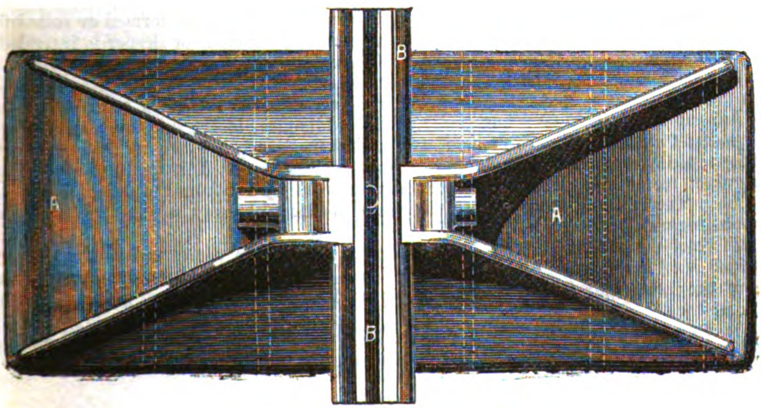


Fig. 6.



AN IMPROVED PERMANENT WAY.

It is with pleasure that we are able to bring thus early to the notice of our readers the greatest improvement in the construction of the permanent way of railways that has been produced during the last few years. The patentees of this invention are three in number, viz., Mr. Fenton, of the Low Moor Iron Works, whose engineering abilities are well known; Mr. W. Thompson, jun., railway contractor, of Wakefield; and Mr. T. Snowdon, iron-master, of Middlesboro-on-Tees.

The invention consists in forming the joint and other chairs of the permanent way of railways of a combination of wrought and cast iron, the latter being cast on to the former, and the two, when combined, forming a joint or other chair in one piece or mass; the arrangement being such that the rail or rails are held in the chair on the same principle as a piece of iron or other material is held in a vice when being operated on by a workman; the bolts and nuts or keys which secure the rail or rails to the compound chair are thus prevented from slacking back or becoming loose. The cast-iron portion of the compound chair may be cast on to the wrought-iron portion at or about the centre of its length, or at each end of it, or both, and the cast-iron portion may be increased in dimensions, so as to form the sleeper or bearing which carries the upper structure of the permanent way on the ballast.

The novelty and value of this invention consist in casting the cast-iron part or parts of the chair on to the wrought-iron part, by which an action analogous to that of the vice is obtained in holding the rails in the chairs; and, further, any tendency either to elevate or depress the ends of the rails has the effect of keeping the bolts and nuts or keys from getting loose.

In the engravings on the preceding page we have represented the manner in which the improvement is applied to a permanent way constructed with wooden and iron sleepers. Figs. 1 and 2 are respectively an elevation and a cross section of a joint chair bolted to a sleeper of wood. In each of these figures, A is the sleeper, B is the cast-iron portion of the chair, and C the wrought-iron portion—the latter constituting a box girder, which supports the ends of the rails. This box-girder has in some cases two cast-iron portions or feet cast upon it. Figs. 3 and 4 are a cross section and a plan of an intermediate chair bolted to a sleeper of wood. In each of these figures also, A is the sleeper, B is the cast-iron portion of the chair, and C the wrought-iron portion, the latter constituting a saddle-piece which gives an extended support to the rail. In Fig. 3, C′ is a loose or moveable wrought-iron jaw, which is entered into the mortise or recess, *a*, after the rail is in its place. Figs. 5 and 6 are respectively a section and a plan of a joint chair for a cast-iron road, in which A is the cast-iron portion of the chair, and B the wrought-iron portion.

Although we have represented certain forms of chairs, sleepers, and rails in the engravings just described, it should be understood that the patentees do not confine themselves to these or any other particular forms, in so far as the cast-iron portions are concerned; and the wrought-iron box-girder, saddle-piece, and jaws may be formed to suit any desired sections of rails.

They form the wrought-iron box-girders, saddle-pieces, and jaws out of plate and bar iron, but these may be rolled at once into the requisite forms.

In laying down a line of railway, the wrought-iron box-girder, when formed or rolled to fit the particular section of rail for which the compound joint chair or sleeper is intended, is placed in a moulding-box along with the model or pattern of the cast-iron part or parts; the sand is then rammed up in the usual manner, the model or pattern, or models or patterns, are withdrawn, and the molten cast iron run into the moulding-box around or partly around the wrought-iron box-girder. The saddle-piece in the intermediate chair or sleeper is dealt with in a similar manner, except that the wrought-iron part is introduced into the moulding-box after the model or pattern is withdrawn. This mode of producing the required result may, however, be varied without departing from the principle of the invention. The bolt and other holes in the wrought-iron parts may be punched or drilled in the ordinary way.

It will be observed that in both the joint and intermediate chairs and in the sleepers the principle of the vice is fully carried out, there being a constant tension between the heads of the bolts and the nuts effectually preventing the latter from getting loose or "slacking back."

The molten cast iron is run through taper holes in the sole of the wrought-iron box girder and saddle-piece to ensure their firm adherence to each other.

The compound joint chair, or sleeper, not only enables the rails to be made nearly or quite as strong at the joint as at any other part, but also gives equal elasticity throughout the whole length of road. The wrought-iron saddle-piece is cast into the intermediate chair and sleeper partly for the purpose of extending the bearing of the rail in them; but both the joint and intermediate chairs—the wrought-iron box girder in the one and the wrought-iron saddle-piece in the other—by their elasticity perform the important function of preventing the underside of the rail from being galled or cut, which is invariably the case when it rests on the cast-iron chair direct. They also prevent that jar or harshness of motion which is so objectionable in running over the cast-iron roads now in use. When it becomes necessary to turn a rail the underside will present as smooth and even a surface as when first laid down, instead of being indented at every chair.

"Our compound girder joint chair possesses," say the patentees, "an amount of safety which, it is believed, no other joint chair possesses; for, if every bolt should get broken or taken out, the joint would still remain absolutely safe, as the rails could then neither 'lip' laterally nor vertically to a dangerous extent."

A portion of this permanent way, both with wood and cast-iron sleepers, has been laid down on the Lancashire and Yorkshire Railway, upwards of six months, where the trains daily passing over it are most numerous, and many of them of the heaviest description; a very large amount of "shunting" is also daily going on over it, yet, as we are informed, it maintains a "truer top," and keeps better "in line," than any other Permanent Way yet laid down; and further, the cost of platelayers' labour is reduced to such an extent that the patentees are prepared to maintain this permanent way, on any line of railway, at 30*l.* per mile per annum less than the ordinary road now costs. They are also prepared to supply rails, and guarantee them, at a considerably less price per ton than that usually charged for such rails when laid in the ordinary manner.

MR. DENISON, Q.C., ON LOCKS.

We never have favoured, and we hope never shall favour, the absurd cry which is sometimes raised against amateur labours in science and art, for it often happens that a man's profession but ill accords with the bias of his genius, or affords but little scope for his natural and just ambition. At the same time we look for modesty and sincerity in every man who, while he clings to one profession for gain, seeks reputation in another, or in several others; and we cannot easily brook conceit, rashness, intolerance or bluster from him. With the experience of the past few years before us, we cannot help feeling that, if it would be unjust to impute these latter characteristics to Mr. E. B. Denison, M.A., Q.C., M.R.I., &c., &c., he certainly is in no degree remarkable for the former. Yet, by some means or other, this gentleman manages to keep a good position among men of true eminence and worth, and the audience of the Royal Institution, which on one Friday evening hears the pure and reverent Faraday expound the deepest laws of the universe, on the next hears Mr. Denison puff his own books and the locks of the American Hobbs, and degrade to the lowest point the first manufactures of the country. That there is no exaggeration in this statement will appear from what follows.

On Friday evening, Feb. 19, Mr. Denison gave to the Institution mentioned what was denominated a lecture "on some of the Improvements in Locks since the Great Exhibition of 1851," and, in order that we may in no way misrepresent what he stated, we give the following official report, to which we shall add a few elucidatory remarks:—

1. It is impossible to give an intelligible abstract of the mechanical details of this lecture without drawings; but the substance of it will be found, among other matters relating to locks, in the second edition of Mr. Denison's book on *Clocks and Locks*,* reprinted, with additions, from the *Encyclopædia Britannica.*

2. He proposed to take up the subject

* Published by A. and C. Black, Edinburgh and sold at Dent's, 61, Strand.

where it was left by the late Professor Cowper, in a lecture here in 1852. Mr. Cowper had been one of the arbitrators in the case of Hobbs *versus* Bramah, and he explained in that lecture the mode in which both the Bramah and Chubb locks had been picked by Mr. Hobbs in 1851; which applied equally to every English lock then in existence, of a higher order than the common warded locks, which had long been known to possess no security at all.

3. Mr. Denison said he believed there was still a notion prevailing among persons who ought to know better, that the picking of locks by this method required singular skill and dexterity, such as need not be feared from ordinary lock-pickers. That was quite a mistake, now that the method is so well known to everybody in the lock trade, and to everybody who takes the trouble to look into any modern book on locks. The long delay of the thieves who opened the box with a Chubb lock on the South-Eastern Railway, in the gold-dust robbery, only proved that they were grossly ignorant of their business. Any moderately good hand, among not merely Mr. Hobbs' but Mr. Chubb's own workmen, would have opened the box, and shut it up again, between London and Reigate. Indeed, in a trial before Lord Campbell, a few years ago, one of Mr. Chubb's men confessed that the picking of one of his locks, or of any others then known to him, was merely a question of time; and Mr. Hobbs has several times said in public, that he is acquainted with persons, both in the trade and out of it, who can pick locks quicker than he can, now that the proper way of doing it is known.

4. Moreover, the time required to pick the best locks of the usual construction is really very small. Mr. Denison said he had seen one of the newest Bramah locks, with eight sliders, or eight slits in the key, picked in less than four minutes; and it is part of the regular business of Mr. Hobbs's shop in Cheapside, to send men to open Chubb and Bramah, and other locks of which the keys have been lost, or which have got out of order.

5. For this and other reasons, more fully explained in the book referred to, the Bramah or Mordant lock, which has not been at all improved since 1851, has no longer any pretence to be reckoned among the secure class of locks, but ought to rank with others—if not below them—which are now sold for much less, such as Tucker's, Parnell's, and Hobbs's cheap locks, even those which have not the addition to be mentioned presently. One of the good effects of the exposure and defeat of our best locks has been the invention of a greater variety of really different locks in the last six years, than in the previous sixty, or six hundred. The competition thus arising, and especially the establishment of a lock factory by Mr. Hobbs himself, where locks are made by machinery (like Colt's revolvers and the American clocks), has effected a great reduction in their price. The common three-inch drawer locks, with four tumblers, equal to the best locks of 1851, are now sold by him at 27*s.* a-dozen, and by Mr. Tucker, and perhaps other makers, at about the same price. It may be as well to mention that the piece called the "detector," by which the Chubb lock gained so much of its celebrity, is of no use whatever towards the prevention of picking by the method which is now generally connected with Mr. Hobbs's name; though it is in reality much older, and been actually published in a former edition of the *Encyclopædia Britannica*, thirty years ago, as applicable to the Bramah lock as first made, without false notches; only no one had ever thought of applying it to tumbler locks, which were invariably made without false notches before 1851, with the single exception of Strutt's lock, which was invented in 1819, but never came into general use.

6. It should be observed that the mere variety of locks of different constructions, and the same outward aspect, is to a certain extent a source of security. Formerly, a thief knew almost by looking at the keyhole of whose make and of what construction a lock was; but there are now so many locks and keys, all of the same general appearance, that you can no longer tell by the mere look of the outside what kind of machinery you have to deal with inside; any more than Mr. Hobbs knew, when he accepted a challenge to pick one of Mr. Cotterill's locks, that it contained an additional contrivance not to be found in those locks as generally made and sold, and therefore of course he failed, though the Cotterill locks commonly sold are quite as easy to pick as Bramah's, and in just the same way.

7. The principle of all locks above the rank of the common warded locks, whatever may be the details of their arrangement, is this:—There are a number of similar pieces (which may have the name of tumblers, levers, sliders, discs, rings, or pins, according to circumstances), each with a notch in it at a different place; and until all these notches are brought together into one given position, the pieces in question, or some of them, prevent the passage of another piece in the lock, on which its

opening depends. Mr. Denison exhibited a model, made not to resemble any particular lock, but to illustrate this general principle of them all; and he showed on it the application of the "tentative" mode of picking by applying pressure to the bolt, and then gently moving each of the tumblers or sliders, &c., in succession, on which any pressure is felt, until all their notches come under the piece which has to enter them, and then the bolt yields to the pressure, and goes back.

8. As soon as the vincibility of all the best English locks by this method had been demonstrated in 1851, the makers of tumbler locks began re-inventing several old contrivances, and especially the false notches of Strutt's lock of 1819, or it may be said, of Bramah's lock of 1817; for all the good Bramah locks (including the very one on which Mr. Hobbs won the 200 guineas) had been made with false notches since that time; and tumbler locks in America had also had them, as well as other contrivances since introduced here, but without defeating the art of the lock-picker. False notches do undoubtedly increase the difficulty of picking, and the time required for doing it; but the facts already mentioned are quite sufficient to show that they do nothing more. Of course that is worth something; but it is very far short of restoring the Chubb and Bramah locks, for instance, to the position which they enjoyed while the tentative method of picking was unknown, and when they really were impregnable by any known mode of manipulation.

9. The first invention which really defeated this process of lock-picking was appropriately enough Mr. Hobbs's own. What he calls his "protector," or moveable stump lock, is so made, that as soon as you try to make the bolt press upon the tumblers, the pressure is taken off them altogether, and transferred to a fixed pin in the lock, which would prevent it from being opened in that state of things, even if all the tumblers were then raised to the proper height. This is done by the moveable stump, for a description of which we must refer to the book above-mentioned, or to the *Rudimentary Treatise on Locks*, in Weale's Series. This invention, in its present form, is perfectly effectual against any mode of picking yet known. At any rate, a challenge to attempt it was refused by that same Mr. Goater, who confessed, at the trial above referred to, that he could pick the locks of his own master, Mr. Chubb, and pretended to be able to pick any others as well, and had really picked one of Hobbs's locks as they were made at first. This "protector" lock, it should be observed, is quite distinct from the great American lock with a changeable key, also made by Mr. Hobbs here, but invented by Day and Newell, of New York, a far more complicated and expensive machine, and with the disadvantage of requiring a very large key, and apparently not more real security than the "protector" lock, except so far as the power of changing the lock by re-arranging the "bits" of the key may be supposed to increase its security by guarding against the risk of an impression being taken from the key; and the lock is also not without some special risks of its own, which might have remarkably unpleasant consequences, if the key got into the hands of a mischievous person, either while the lock is open or shut.

10. A variety of inventions are described in the above-mentioned book on *Clocks and Locks*, and in the large volume on locks, published by Mr. Price, of Wolverhampton, all aiming at the same object as the moveable stump, but very few of them doing it successfully. Revolving curtains, and barrels, and "detention catches," and "self-acting," and "double-action levers," and a variety of other recent inventions of old and new things, may be dismissed at once with the same remark as the false notches; viz., that they make a lock more troublesome to pick, but they do no more; and they are all only more complicated contrivances for doing that incompletely which is done completely and with great simplicity by the moveable stump of the "protector lock."

11. The only inventions of this class which Mr. Denison thought deserving of special notice, were a series of locks by Mr. Tucker, of Fleet-street, of which specimens were exhibited, with a large model of one of them, as of the other locks described in the lecture. They have also the merit of being simple and cheap, and unlikely to get out of order, and if not equal to Mr. Hobbs's in security, they would baffle any but a very first-rate hand at lock-picking, and are certainly superior to several more expensive locks which profess to defeat the tentative mode of picking.

12. The lecturer also described and exhibited a lock of an entirely different construction, invented by himself. It is not intended for furniture and small work, but for doors of safes, prisons, and other places where a lock of great strength as well as security is required. A description of it will be found in all the three books above-mentioned, and it is the only English lock to which the merit of security against any known method of picking is ascribed by

Mr. Hobbs, in the *Rudimentary Treatise on Locks*. Its peculiarities and advantages are, besides the important one already mentioned: First, that a large and strong lock requires only a very small key. (2.) It requires no key to lock it, but merely the turning of a handle, the key being required for unlocking only. This obviates the necessity for leaving your keys in the hands of other persons, if you are only present when you want to open your door or safe, and also removes the temptation to leave them in the lock, which affords great facilities for having impressions taken from them. (3.) The key-hole is so small that no instrument strong enough to force the lock can be got in. (4.) The key-hole is kept closed by a spring plate or curtain, which is pushed in by the key; and when the lock is open, no instrument whatever can be got into the key-hole to explore the lock. (5.) This curtain also keeps out dirt and damp air, which frequently cause locks to get out of order, or, at any rate, to want cleaning. (6.) There are no tumbler springs, and so the tumblers can neither fail from the springs breaking, nor can they stick together; both of which things not unfrequently happen in tumbler locks with springs, and without separating plates. (7.) The moving pieces in the lock are as few as possible, being, in fact, none but the bolt, the tumblers, and the curtain. (8). Hence also the lock is easy to make, and cheap, and requires no fine work to prevent friction of the parts and make it move easily. It is not patented; the inventor being one of that increasing number of persons who think that patents are an obstruction to science, and waste more money than they gain for real inventors, whatever they may do for patent-agents and patent-buyers. One of the locks exhibited on this construction was made by Mr. Chubb, and Mr. Hobbs also applies them to safes, &c., when ordered, though they are not yet made for sale.

13. The spring-curtain of this lock may be adapted to almost any other, and is particularly recommended for street-door or "latch" locks, as they are called, which are very liable in such towns as London to be spoiled or put out of order by the action of the air and dirt upon them. Mr. Hobbs adds this curtain to his latch locks for a trifling extra charge, the cost of making it being insignificant; and it supersedes the necessity for an external "scutcheon" on the key-hole, which seldom keeps long in action, and is not so effectual as this self-acting curtain.

14. Mr. Denison also exhibited three small bells, made by Mr. Mears: one of the same metal as the great bell of Westminster which he is now re-casting; another, with the addition of as much silver as would amount to 1 cwt., and cost 500*l.*, in a sixteen-ton bell; and the third with rather more. These bells clearly bore out the statement made in the lecture on bells last year, that the tone would not be improved by adding silver, of which also no trace has been found in any old bell-metal that has been analysed.

The foregoing Report, the paragraphs of which we have numbered for convenience of reference, is authenticated by the initials of Mr. Denison's name, and may, therefore, be taken as his own. Let us now look into it, and see how far it is worthy of credit as regards matters of fact.

Paragraph 3.—"The long delay," &c. This statement shows with how little correct information Mr. Denison is contented in discussing topics of importance. In the first place, the "thieves" who opened the box were concentrated in the person of one Agar, who, among his many accomplishments, was notoriously skilful as a lock-picker—instead of being "grossly ignorant" of his "business." Secondly, how was the box "opened"? By picking? Certainly not. The accomplice Tester, who obtained temporary possession of one key, gave it to Agar to take impressions, and of the second he contrived to obtain an impression elsewhere. From these impressions he made new keys, and even then confessed that he was occupied during seven or eight journeys from London to Dover in altering them until they fitted. Thirdly, the statement that Hobbs's or Chubb's workmen could have opened the box and shut it up again between London and Reigate is altogether without foundation.

Par. 4.—"It is part of the regular business," &c. First, this is a mere assertion. Secondly, it is known that the "tentative" method of picking may be successful with *old* locks, long in use and much worn, but this proves nothing detrimental to the locks made since 1851, with the new improvements. The practical question is, are or are not Chubb's locks secure against thieves and housebreakers?

Par. 5. — "The common three-inch drawer locks," &c. This is really mere nonsense. First, Mr. Denison cannot pretend these are secure, as he admits they have not the "protector," which he subsequently maintains affords the only real security. Secondly, their equality with

"the best locks of 1851" is absurd, there being really no comparison whatever between them. Thirdly, 27*s*. per dozen sounds well, but there are plenty of *four-tumbler locks* made and sold by the Wolverhampton manufacturers at 23*s*. per dozen —made by hand, and far better finished than those about which Mr. Hobbs' machinery is employed.

Same par.—"It may be as well to mention," &c. This again is not true. A slight over-lifting of any one of the tumblers by the instruments inserted will set fast the "detector," and any further trial at picking will be vain until this be released by an operation which requires considerable time in the absence of the right key. A man attempting to pick the lock may have to leave it in this state for a time, even after each of several attempts, when the owner, on going to it, would find it "detected," and would naturally keep a sharp watch. Does this afford no security?

Par. 6.—In reply to the latter part of this paragraph we are able to state that the Cotterill's lock, which Hobbs tried and failed to pick, was an ordinary commercial lock. The trial took place publicly at Manchester, April 29, 1854.

Par. 8.—Upon reading Mr. Denison's remarks on "false notches," one would imagine that these formed the only improvement in the modern locks, whereas they contain additions of far more importance than these.

Par. 9.—"The first invention," &c. And yet several of these very locks containing the much-vaunted "protector" were picked in a few minutes each by one of Chubb's workmen! "This invention, in its present form, is perfectly effectual against any mode of picking yet known. At any rate, a challenge to attempt it was refused by that same Mr. Goater," &c. This also is not true in fact. Goater offered, at the Institution of Civil Engineers, to pick any Hobbs' lock with the newly *protected* "protector." (See *Mechanics' Magazine*, 4th March, 1854.) But a fact of greater commercial importance is, that any pressure or binding upon the bolts of these locks (a matter of constant occurrence with locks in ordinary wear) will set fast the "protector," and prevent the lock's acting. That owners of locks do not admire this sort of security seems evident from the circumstance of Hobbs's locks having been taken off in large numbers from the strong-room cupboards at the Stock Exchange, their places having been supplied by Chubb's.

Par. 12.—In this paragraph Mr. Denison comes to his own lock, and, as will be seen, he praises it as heartily as if it belonged to some one else. He states its peculiarities and advantages under six heads. 1. "A large and strong lock requires only a very small key." This has always been known as an advantage of Chubb's and Bramah's! 2. "It requires no key to lock it, but merely the turning of a handle." True; but it always requires two actions in opening. 3. "The key-hole is so small," &c. So are Chubb's and Bramah's! 4. "The key-hole is kept closed," &c. So are the key-holes of locks fifty years old! 5. "This curtain also keeps out dirt," &c. So do the curtains of the old locks just mentioned! 6. "There are no tumbler springs." This is not true: there are no less than seven tumbler springs, and three others, making ten separate and distinct springs, which are nine more than there are in Bramah's, and seven more than in Chubb's. Mr. Denison may give these another name if he pleases, but they are veritable springs, and act as such. 7. "The moving pieces in the lock are as few as possible." If this means, as few as Mr. Denison could possibly make them, it is, doubtless, correct. If it means, as few as they ever will be made, it is an unwarranted assertion. 8. "Hence also the lock is easy to make, and cheap." Not so; it is a much more expensive lock than Chubb's. "They are not yet made for sale." This is quite true. They are not likely to be made for sale. They have been puffed, as in the present instance, for six years, but no patent exists, and no maker has as yet been found foolish enough to spend money on them. It cannot be said that they have yet been picked, because there has been none made for sale.

We cannot quit this subject without remarking that in this lecture Mr. Denison exhibits considerable *animus* against English manufacturers, especially those of the Bramah and Chubb locks. He points out all defects prior to 1851, and gives no credit for the subsequent improvements, but either ignores their existence or slurs them over. The learned Q. C. applies himself to plead the merits of, and to set up as models, certain locks, of which he does not point out a single objectionable quality. This of itself were bad enough. But Mr. Denison appears particularly fond of quarrelling with our old-established trades. Clocks, locks, and bells have all come under his sweeping condemnation in turn, and he has set himself up as the arbiter in everything pertaining thereto. *Aut Denison aut nullus!* The great clock at Westminster has yet to be fixed, and one day will decide the merits of many disputed

points concerning it. But we have had an opportunity of judging of the learned gentleman's abilities. "Big Ben" was his *chef-d'œuvre*; and a correspondent tells us in the following letter what a wonderful creation that has proved. Yet "Big Ben" was not produced until Mr. Denison had fallen foul of some of our first bell manufacturers, and had announced his intention of creating the first bell in Europe. In effecting this, he had everything his own way, and the work was executed strictly according to his directions by Messrs. Warner. And with what a result!

To conclude; after all the vaunting which we have heard of Mr. Denison's skill, and all the hauteur with which he has treated sound practical men whenever they have ventured to question his proud pretensions, we have at last to confess that his reputation as a man of practical science rests upon a cracked bell and a gimcrack lock, and that we really cannot recommend to the public the services of E. B. Denison, Locksmith and Bell-hanger.

BIG BEN.

To the Editors of the Mechanics' Magazine.

Gentlemen,—In spite of all the praise lavished upon "Big Ben" by those under whose superintendence he was brought into existence and their friends in the press, he had not long been paid for when he was discovered to be cracked, and it was found necessary to break him up. His fate, however, is not to be regretted, for it is certain that he would never have been passed, or the account for his casting certified by any person experienced in castings.

Having been absent from London, I had no opportunity of seeing or hearing "Big Ben," but his broken fragments show that, independently of the crack that caused his end, there was a straight vertical flaw 10 inches long and 3¾ deep inside the soundbow, reducing the thickness for strength in that part from 9⅛ to only 5⅜ inches. This flaw has no appearance of having been caused by the clapper, nor by any accident subsequent to casting, but of having occurred while the metal was cooling, and therefore, nothwithstanding Mr. Denison's clever laudation of the tone of the bell, I am forced to the conclusion that it never could have sounded as a good bell of its weight ought to have done, and this I believe is the impression of most persons who have heard it.

The bell, when cast, was found to have a waist 1⅛ inch thicker than it ought to have been, but this defect Mr. Denison ingeniously endeavoured to twist into a merit when he lectured last year at the Royal Institution, by facetiously telling his audience that by some unaccountable circumstance his bell when cast weighed sixteen, instead of the intended weight, fourteen tons, and he congratulated the public upon its having obtained by mistake a sixteen instead of a fourteen ton bell; whereat his audience was very much pleased, being in the dark as to the fact that the extra two tons were laid on in the wrong part of the bell, and that the bell was much less effective than a properly-proportioned fourteen-ton bell of the same diameter of mouth would have been.

The newspaper accounts of the breaking-up of the bell have already noticed the *speckiness* of the metal—a fault which, as the fragments show, prevailed to a serious extent, amounting to sponginess in some parts, *while the boss by which the bell was to have been suspended was actually hollow;* and I have heard that, while the bell hung at Westminster, this hollowness of the boss was concealed from view by a superimposed piece of wood.

In short, taking into account the mistake in the weight and thickness, the flaw in the soundbow, and the general badness of the casting, there can be no doubt that the bell, instead of being sent to Westminster, ought to have been broken up as soon as it had seen the light, and would at once have been condemned by any competent person.

In consequence of the blunders committed in casting and shipping this bell, and the adoption of a most unnecessarily complicated mode of hanging, it has already occasioned an expenditure of 3,450*l*. of public money for what has only proved a gigantic failure. The clock-tower remains at present silent, but the recasting is at last in good hands; and, if the suggestions of Messrs. Mears are not unreasonably interfered with, it may with confidence be expected that a new "Big Ben" will shortly rise from the casting-pit of their justly celebrated foundry capable of emitting sounds far surpassing in quality those of the former, and, we will hope, with a probability of continuing to please the ears of generations to come, after as many centuries as his predecessor has lasted months.

Yours obediently,

W. Lewis Baker, C.E.

London, March 11, 1858.

[We cannot give place to the foregoing letter without offering a remark in mitigation of the discredit which it appears, when read superficially, to cast upon the eminent manufacturers by whom the late

"Big Ben" was made. Our correspondent says, very significantly, that much may be expected of the new bell "*if the suggestions of Messrs. Mears are not unreasonably interfered with.*" We cannot but believe that, if this condition had been complied with in the first instance, no new bell would have been necessary. Was Mr. Denison, or were the ostensible manufacturers, really responsible?—EDS. M. M.]

AN ENHARMONIC ORGAN.*

BY GENERAL T. PERRONET THOMPSON, M.P.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—No more of prelude will be introduced, than appears necessary for explaining the objects of the mechanism to be described.

It is fast approaching to being a generally admitted truth, that singers, to the extent the cultivation of their ear admits, sing what the ancients intended by *enharmonically;*—that is, make the *harmonious* or just intervals of the musical scale, first from one sound, which is called singing in one key, and then in a multiplicity of keys, by making the same intervals over again *de novo*, beginning from one of the previously established sounds. The effect of which is to light sometimes on the same sounds as before, but often on different. The system which minces up these differences into twelve sounds which shall serve all purposes, is denominated *temperament.* The "Sol-fa Associations" have done much towards progress. The violists are behind the singers, but in time they will, perhaps, take the same course.

The foundations of musical relation are within ken, to the same extent as of optical. That shortening a string by the *half* produces what from the place it finally holds in the musical scale is called the Octave; by the *third* part, the Fifth; by the *fourth* part, the Fourth; by the *fifth* part, the Major Third; by the *sixth* part, the Minor Third; by *three-eighths*, the Minor Sixth; by *two-fifths*, the Major Sixth;—is as good evidence that the simplicity of these proportions, or the coincidences of the vibrations arising out of them, are at the bottom of what we call harmony, as that a distinct image on the *retina* or membrane of the eye is at the foundation of vision. We may be unable to tell why these consequences follow; but that they do follow, is what there is no room left to doubt.

The sounds named are what are called the Consonances; from their agreeable effect when sounded along with the first or key-note. If they were only one or two, there might be doubt whether simplicity of proportion was the foundation of their peculiar quality; but when they are upwards of half-a-dozen, there can be none. And the next thing is to divide the large equal intervals left at each end of the scale, in a manner which shall form concords with some or other of the Consonances previously determined. The ready way to which, is to divide into a Minor and a Major Second at one end, and by analogy a Major and Minor Seventh at the other. The sounds so made are called the Dissonances.

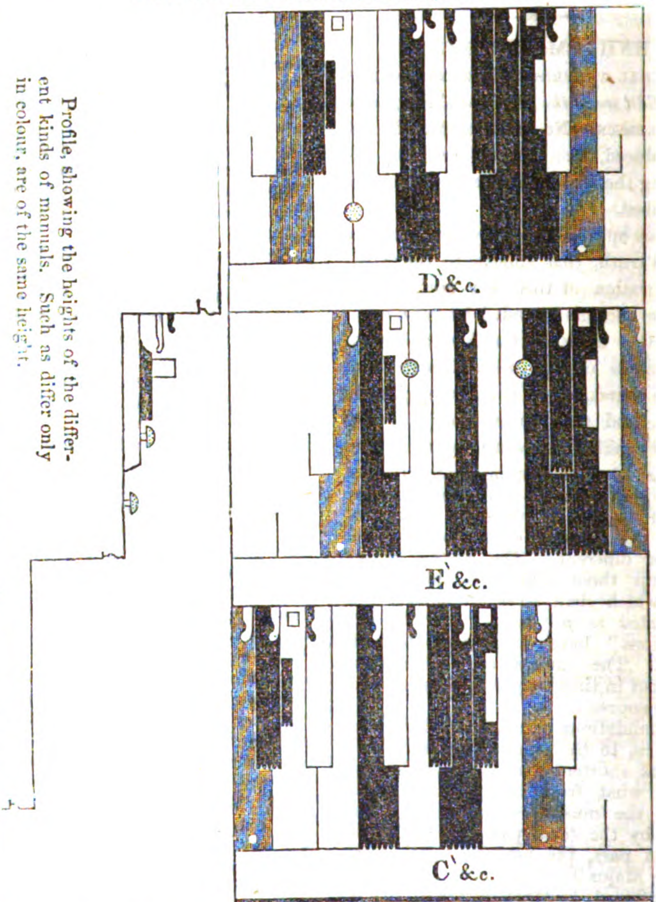
And here starts to light the fact on which the reformers mainly trust for the solution of difficulties,—that the Dissonances are *double*, or have two *forms* differing by the interval called a Comma, which, though the object of the temperers is to make light of it, is eleven times what the tuners recognise as sensible to the ear. And it will be plain to an arithmetical eye, that these two *forms* make concords with the Consonances alternately,—that is to say, the grave form with the Fourth and Sixths, and the acute with the Fifth and Thirds. If therefore all these are distinguished by being the one set black and the other white (as is done upon the instrument), a useful aid will be established. The Major Seventh and Minor Second would also be capable of a second form; but as these would make no concord with any of the Consonances, they are never wanted, and therefore may be omitted; a great relief. Add to which, that when the Minor series is in hand, for reasons it would be tedious to go into, no form of the Major Second but the acute is wanted; another great relief. So that there is no occasion ever to look out for more than one of the extraordinary or unusual sounds; to wit, the *grave* Major Second in the Major series, and the *acute* Minor Seventh when the Minor series is in hand. The completeness of the analogy, to the minutest point, between the sounds in the Major and Minor series, and the manner in which they occur at equal intervals with alternation of belonging to the Major or Minor, from the central division each way, are objects for the curious observer.

All this was of easy calculation, and the question was of the mechanism by which it

* Manufacturers, Messrs. Robson, 101, St. Martin's-lane.

could be reduced with tolerable facility to practice. And here the difficulty may be reduced to the Major Second and Minor Seventh having each two manuals, as may be seen by inspection of the finger-boards for the three leading keys. In this the small manuals having resemblance to the keys of a flute, may be put out of view, as having reference solely to the additional keys which can be executed with their help. Mersenne, the great musical philosopher of the seventeenth century, has a drawing of a finger-board with 32 manuals in the octave; but it does not appear to have occurred to him to divide the sounds among more finger-boards than one.

Front View of the Finger-boards, on a Scale of One Fourth.



Undermost board contains Keys of C', F', G', B♭' Major, B♭' Major, E♭' Major, A♭ Major, D' Minor; and by having convertible pipes for G♭' and G♭', C♭' and C♭', the Keys of D♭' Major, G♭' Major, B♭' Minor, B♭' Minor, E♭' Minor. Middle board, Keys of E', B', G' Major, D' Major, C' Major, and (with help from the uppermost board) A', C♯', G♯'. Uppermost board, the Keys of D', A', F' Major, B♭' Major, G', and (with help from the middle board) B', E'', and F♯'. The colours are expressed here as in heraldry. The means of distinction by the blind, are also represented.

Here follows the description of the sounds, &c., in one octave. A line over any number of figures indicates a recurring decimal.

Places in Primitive Key C‘.	Boards in which found.			Names.	Indices.	Measures, in decimals.
Key-note . .	C	E	D*	¶ C‘	0	1·
	C†			C′	1	·$\overline{987654320}$
			D†	C#‶	2	·972
		E	D	¶ C#‘	3	·96
		E†		C#′	4	·9481$\overline{481}$
Minor Second .	C			¶ D♭‘	5	·9375
	C†			D♭′	6	·925$\overline{925}$
					7	
Grave Maj. 2nd	C*	E	D	¶ D‘	8	·9
Acute Maj. 2nd	C	E*		¶ D′	9	·$\overline{888}$
					10	
		E†		D#‘	11	·864
		E		D#′	12	·85$\overline{33}$
	C†		D	E♭‘	13	·84375
Minor Third .	C			¶ E♭′	14	·833
					15	
			D*	¶ E‶	16	·81
Major Third .	C	E	D	¶ E‘	17	·8
		E†		E′	18	·$\overline{790123456}$
					19	
			D‡	E#	20	·768
					21	
Fourth . . .	C	E	D	¶ F‘	22	·75
	C†			F′	23	·740$\overline{740}$
					24	
		E*	D	¶ F#‘	25	·72
Tritone . . .	C	E		F#′	26	·7$\overline{11}$
	C‖			¶ G♭‘	27	·703125
	C‖			G♭′	28	·69$\overline{44}$
		E‡		F×	29	·68$\overline{266}$
	C†		D	¶ G‘	30	·675
Fifth . . .	C	E	D†	¶ G′	31	·$\overline{666}$
					32	
			D†	G#‘	33	·648
		E	D	¶ G#′	34	·64
					35	
Minor Sixth .	C			¶ A♭	36	·625
					37	
			D†	A‶	38	·6075
Major Sixth .	C	E	D	¶ A‘	39	·6
	C†	E†		A′	40	·592$\overline{592}$
					41	
		E†		A#‘	42	·576
		E		A#′	43	·5$\overline{688}$
Grave Min. 7th	C		D	¶ B♭‘	44	·5625
Acute Min. 7th	C*			¶ B♭′	45	·5$\overline{55}$
					46	
			D	¶ B‘	47	·54
Major Seventh.	C	E	D†	¶ B′	48	·5$\overline{33}$
	C‖			C♭‘	49	·52734375
	C‖			C♭′	50	·5208$\overline{33}$
		E‡		B#	51	·512
			D	C‶	52	·50625
Octave . . .	C	E	D*	C‘	53 or 0	·5

¶ Keys. * Quarrill. † Flutal. ‡ Button. ‖ By Convertible Pins.

In the machinery may be included the *Regulator* for correcting the effects of changes of temperature, consisting of bars before the mouths of the pipes, each octave forming a distinct frame capable of being raised or depressed in succession; and a *Monochord* tuned by weight, presenting all the various sounds, and with the opportunity of applying the method of *means*, producing the same kind of ease as a magnifying glass in the case of visible objects where accuracy is desired. The Swell is divided into two at Middle c', each part working separately; and there is a *Concussion-box* to prevent quivering. The pipes at present consist only of an Open Diapason, from C C' in the bass to f''' in alto; the external dimensions of the instrument being $11\frac{1}{2}$ feet by 5, and 8 feet $5\frac{1}{2}$ inches high. But on another opportunity it would be proposed to add a second Open Diapason, a *fac-simile* of the other, on the same regulator, and a Dulciana with a regulator of its own. It is conjectured that in this state the instrument, under the title of "Enharmonic Stop," would be capable of taking the place of the choir and swell organs in a cathedral, and at a diminished cost. Such an instrument would not be a very expensive addition to a theatrical or other orchestra, and might be an acquisition to Choral Societies, Glee Clubs, and Musical Associations in general. References with any further objects, may be made to a shilling pamphlet under the title of *Just Intonation*, published by Effingham Wilson, 11, Royal Exchange.

On the question of ultimate facility, it would be injustice to omit the following. An advertisement headed "Enharmonic Organ" was inserted in the *Times* of June 23, 1856, in which, after a description of the instrument, were the words "A pupil wanted; if blind preferred; pupil should be able to play psalm-tunes, and tell the existing key; in which case six lessons deemed sufficient." A young lady of 19, blind from birth, Miss E. S. Northcote, since Organist of St. Anne and St. Agnes, St. Martin's-le-Grand, whose portrait appears in the pamphlet mentioned, presented herself the next day, and after brief instructions sat down to the instrument. She was familiar with the greatest part of the current ecclesiastical music, and had accustomed herself to begin the subject in any key that was desired. Being free from the terrors impressed by sight, she played in the three principal keys on their respective boards with nearly the same ease as on an ordinary instrument; the difficulties being limited to an occasional demand for the unusual form of a Dissonance, which she readily connected with the Consonance to which it owed its rise. Doubts were felt whether it would be agreeable to her to be asked to classify the sounds under the denominations of white and black; but on the inquiry being made through her attendant, wonder was expressed that there should have been any hesitation, and she was soon able to correct the teacher if an error was made in the *colour* of a note. As shown in the Plate, means were taken for rendering tangible the differences among the coloured notes; but she never had recourse to them. Advancing from one key to another with exemplary energy and patience, after literally only six lessons, and without the advantage of having the instrument to practise on between, she gave two public performances of sacred music as by advertisement in the *Times* of 17th July following. It was plain that, after an acquaintance with leading principles, she went mainly by the ear, changing from one manual to another or from one finger-board to another when wrong, as a performer on the violin would amend a faulty fingering. She showed a delight in difficulties, nothing pleasing her so much as playing on two boards at once with two hands; which, as the boards were not alike, was something like playing two games at chess. The evidence of practicability (which was all that was claimed in the advertisement) was undeniable.

I am, Gentlemen, yours, &c.,
T. Perronet Thompson.

Eliot Vale, Blackheath, March 10, 1858.

THE CHEMISTRY OF GUNPOWDER.

Attention has recently been directed to the nature of the products of the combustion of gunpowder; and the results of the experiments on this head would appear to furnish the data which are necessary to determine a correct formula of the theoretic composition of this substance.

The most important practical inconvenience which is consequent upon the imperfect constitution of ordinary gunpowder proceeds from the undue proportion of charcoal contained in it. If we spread a train of powder upon a sheet of white paper we find that its discharge is generally attended with a considerable amount of carbonaceous residue. The quantity of this residue, so detrimental to the cleanliness both of the gun and its user, is increased when the powder is fired in a confined space. The question to be determined is, whether this large residue of charcoal is absolutely necessary, or whether it proceeds

only from a theoretical error or a commercial motive. It might well be conjectured that if the amount of charcoal existing in this residue had been omitted in the composition of the original powder the combustion of the latter would have been effected in a far more perfect manner; and this conjecture appears to be confirmed by experiment.

The proportion of charcoal in gunpowder of English manufacture is generally greater than in that of any other country. The following are some of the results obtained by Pelouze:—

	Nitre.	Charcoal.	Sulphur.
France, America, Prussia	75.	12.5	12.5.
England	75.	15.	10.
Sweden	75.	9.	16.
Austria	76.	11.5	12.5

In this example the proportion of charcoal in English gunpowder is to that of nitre as 1 to 5. This is hypothetically correct if we suppose the whole of the carbon to be converted into *carbonic acid;* as

$$3C. + S + KO, NO_5 = 3CO_2 + KS + N.$$

But the solid result of the combustion of gunpowder, according to conclusive experiments, being principally KO, CO_2. and KO, SO_3. and not exclusively KS, as was formerly assumed; it would follow that *two* equivalents of carbon remain uncombined, thus:

$$3C. + S + KO. NO_5 = SO_3 + CO_2 + KO + N + 2C.$$

Here the alkaline combination is left out of the question.

Two things are evident in viewing these formulæ: 1. That SO_3 is in excess; as we know that KO, CO_2 is formed; and 2. That the surplus carbon and sulphur should be diminished, in inverse proportion, in the normal composition of the powder.

Subtracting one equivalent of carbon the composition of gunpowder would be

$$2C. + S + KO, NO_5.$$

and there would still be a surplus of either C or S.

In reducing this surplus and in rendering the proportions into practice we must bear in mind,—

1. The impurities of the charcoal, the oxygen of which, in a sample analysed by Messrs. Bunsen and Schischoft, amounted to $\frac{10}{16}$; thus,

Charcoal	Carbon . .	7.69
	Hydrogen .	.41
	Oxygen . .	8.07

The oxygen liberated from $KO.No_5$ would therefore, in presence of the reduction of one equivalent of C, be augmented by $\frac{1}{16}$ nearly. And the amount of actual carbon diminished by $\frac{1}{3}$ nearly.

2. That the whole of the nitrate must be decomposed.

3. That if we reduce sufficiently the proportion of S. the whole of the 2C. may enter into combination producing greater power.

4. That the proportion of S. must not be reduced beyond the point in which it is most effective in producing the chemical changes on which depends the efficacy of the powder.

The combining power of C. with O. is to that of S. with O. as 2 to 3. Therefore S., being reduced to effect the perfect combination of C., may stand

$$\frac{S}{3}$$

and the expression would then be:

$$2C. + \frac{S}{3} + KO.NO_5 = 2CO_2 + \frac{S}{3}O. + KO. + N.$$

The proportion of S. may, however, be increased to effect the combination of the surplus oxygen, and also to supply the actual deficiency of carbon when the theoretic proportions are applied in practice to impure materials.

We will represent the surplus O. by $\frac{O}{2}$; requiring $\frac{S}{6}$ for its acidification by sulphur.

And the deficiency of C. by $\frac{14}{3}$; which may be replaced by a surplus of S. represented by $\frac{14}{2}$.

$$\frac{S}{3} + \frac{S}{6} = \frac{S}{2}$$

the proportion of which may be represented by 8.

We have, moreover, $\frac{S}{7}$, which may be represented by 2.28. Thus the total amount of sulphur is 10.28; and the theoretic proportions of the ingredients of gunpowder

Nitre.	Charcoal.	Sulphur.
101.	14.	10.28.
	Or,	
75.	10.39	7.63.

By adopting these proportions the undue preponderance of charcoal and its inconvenient effects are avoided, and the greatest amount of power, in all probability, attained.

DESMOND G. FITZGERALD,
Consulting Chemist.

27, Upper Berkeley-street,
Portman-square.

THE PRODUCTION OF ALUMINIUM.

M. PETITJEAN, a French chemist, resident in London (the inventor of an admirable method of silvering mirrors cheaply, which was brought to the notice of the Royal Institution some time since by Professor Faraday), has effected an improvement in the production of aluminium, which promises to still further reduce the cost of that valuable metal beyond all that has hitherto been anticipated. His invention consists in transforming so much of the aluminium as is present in the substances with which it is found naturally combined into one or more sulphurets; and then removing the sulphur therefrom by the aid of carbon, or a hydrocarbon, or of a suitable metal or metals, mixed therewith, and exposed in a crucible to a high temperature, after which the aluminium in a metallic state will be deposited in the crucible. The process is equally applicable to the production of magnesium.

SIR F. C. KNOWLES, BART., has also taken out a valuable patent for the manufacture of aluminium. His invention consists of a method of preparing the cyanides of potassium and of sodium, and in the use of those cyanides in the making of the aluminium. To form the cyanides the patentee combines anhydrous carbonate of potash or anhydrous carbonate of soda, as the case may be, with fine charcoal, in such a proportion as to convert the carbonic acid into carbonic oxide by the action of heat, and to decompose the alkali used. He places this mixture in a chamber with lumps of charcoal, such chamber being of fire-clay, fire-brick, or iron; and then, having heated the same sufficiently, he passes through it a current of the waste gases of blast furnaces used in smelting iron ores, or of the same or similar gases obtained intentionally from a cupola by a blast of air. The nitrogen contained in these gases combines with the charcoal to form cyanogen, and this, uniting with the metallic base of the decomposed alkali, forms a vapour of the cyanide required, which can be collected by sublimation in appropriate chambers and cooled. To make the metal aluminium, he takes one or other of the above cyanides and the chloride of aluminium, and by passing the vapour of the chloride of aluminium through, or otherwise combining the same in the form of melted chloride, or its vapour, with the melted cyanides or their vapour, he obtains, by double decomposition, chloride of sodium or chloride of potassium and the metal aluminium, which can be readily collected and fused. Pure alumina may be added to the materials to increase the yield of metal and to economise the cyanide, and this he recommends to be done in most cases.

IMPROVED ORDNANCE.

[The ill-health of the author prevented the following letter being forwarded in time for No. 1804, as intended.—EDS. M. M.]

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I am glad to find by Captain Jervis's letter, which appears in No. 1803, his sudden but most complete change of opinions, and perhaps "Observer" has a right to congratulate himself as the immediate cause of drawing from this able officer so frank an avowal. Some weeks since Capt. Jervis professed, in a few words, to refute, with indignation, the arguments of Capt. Blakely, who had written to the *Times*, that the Select Committee at Woolwich, being composed chiefly of heads of Departments, "had not time to investigate the inventions proposed to them, as each member had his time fully occupied with other duties."

This appears to me, Gentlemen, to be the very ground now taken by Captain Jervis in reply to my letter, and no doubt its influence will be acknowledged and responded to by other able officials in the ordnance branch of the service, and help to bring about the change so much required.

"Observer," having the improvement of the public service before him, is in no way inclined to allow a few strong unguarded words from those gentlemen—*which both have given him in turn*—to defeat the object in which he hopes to find them equally interested; and he quite agrees with Capt. Jervis, that "no radical change should take place by the introduction of a new weapon in the service, which must naturally entail great expenditure, unless the advantages conferred are distinct and conclusive."

It is of the want of a strict observance of this valuable rule "Observer" complains, and which, as previously remarked, has cost the country millions within his recollection; "*and trials made on a limited scale*" are not calculated to meet this important national question so economically as is desired.

Capt. Jervis and Capt. Blakely having arrived at the same conclusion, will now, I hope, act in unison and exert themselves with the Government in removing every obstruction to ordnance improvement by the adoption of appropriate means, such as their joint opinions so clearly suggest, and

thus give great satisfaction to the "enlightened" readers of the *Mechanics' Magazine* who feel interested in scientific progression.

"*Forward*" is the order of the day, and as England cannot afford to stand still, all the tax-paying portion of the country ask is, a right direction and no real cause for complaint against those charged with public improvement. Convince the British people that their money is *well spent*, and they will not be inclined to trouble the Government about the amount—aware that well-spent money is true economy; and if this has not been properly comprehended at the War Department, it is because it has not been rightly considered by those who have not the time to regulate the expenditure in unison with its legitimate course. Let Woolwich set the example by recommending measures which they know and feel are required, and the evil consequences of the past mistaken notions of economy will soon be forgotten by the "tax-payer," from whom they will have nothing in future to fear.

OBSERVER.

March 3, 1858.

RIFLE GROOVES.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Mr. J. Z. Mitchell asks you some questions about the date of the first use of rifle grooves; perhaps the following may be of some use to him:—

Gaspard Zollner, of Austria, is supposed to have first rifled small arms about the end of the fifteenth century, but the reasons for doing so were first pointed out by Mr. Robins in 1745, in a paper read to the Royal Society.

Until recently no advance has been made, but now two steps are in progress (not yet fully developed), viz., the elongation of the bullet so as to present a smaller surface to the resistance of the air, and the increase of facility in loading. It is in the latter respect that the Minié bullet was an advance, descending easily into the barrel, but bulging, so as to fit closely in coming out, in consequence of an iron cup which the pressure of the gas forced into the leaden bullet. This is only advantageous for a muzzle-loading rifle.

The question of the length of the bullet is in good hands—those of Mr. Joseph Whitworth. A long bullet has for many years been used for sporting purposes, in consequence, I believe, of some experiments made at the suggestion of Col. Hudson to obtain a low line of flight. Capt. Norton suggested both an elongated bullet and an expanding one thirty years ago. The desideratum now is a good breach-loader.

I am, Gentlemen, yours, &c.,

B.

ON DIVIDING THE ARC THROUGH WHICH A PENDULUM VIBRATES.

To the Editors of the Mechanics' Magazine.

GENTLEMEN, — If your correspondent "Mechanicus," at St. Andrew's, has not sooner received an answer to his request in your Magazine of 29th August last, for assistance to divide the arc through which a pendulum vibrates into hundredths of a second, I would suggest trial of the following:—

Make a pendulum vibrating in two seconds, and let the arc between the point of rest and the greatest departure from it be determined to be a foot, measured by rolling the arc along a scale of equal parts. Divide a foot on the same, into the versed sines of every 54′ (by successive addition); for the radius of a foot. Transfer these divisions to the arc, by rolling as before. Do the like with the arc on the other side the point of rest.

Inferred from "Vince's Fluxions," p. 129, of 4th edition.

Yours very sincerely,

T. PERRONET THOMPSON.

Eliot Vale, Blackheath, March 10, 1858.

ON THE MOON'S ATMOSPHERE.

To the Editors of the Mechanics' Magazine.

GENTLEMEN, — "J. T.'s" comparison with Mont Blanc fails, through the circumstances being not only unlike, but contrary.

All we know of the component parts of Mont Blanc is, that they are non-elastic and of constant density. All we know of the component parts of the atmosphere is, that they are elastic, and, so far as they can be subjected to examination, diminish in density in proportion to every diminution of pressure.

If it is to be urged that perhaps at distances to which we have no access it may be otherwise, the same might be advanced to prove the impropriety of calculating upon gravitation beyond the planet Neptune.

Yours sincerely,

T. PERRONET THOMPSON.

Eliot-vale, Blackheath, March 17, 1858.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Lord, T. W. *A certain improvement in machinery for carding flax, tow, and other fibrous substances.* Dated June 16, 1857. (No. 1677.)

This consists in the application of a cage or grating formed of bars or rods of wood, iron, or zinc in front of and below the workers or strippers covering a portion of the cylinder, which prevents the material from falling, but allows the dust and shive to fall, carrying forward the fibre which is valuable.

Smith, W. *Improvements in steam-generators.* (A communication.) Dated June 16, 1857. (No. 1678.)

Generators are here composed of a series of tubes through which the water passes, and becomes all converted into vapour.

Cocker, J. *An improved construction of gauge for measuring wire and other articles.* Dated June 16, 1857. (No. 1680.)

The patentee combines in one pocket-instrument, the means of measuring a large range of sizes. He claims constructing gauges on the principle of gripping the article to be gauged between a projector on a swinging arm and the periphery of a snail cam plate, over which that projection moves, as described.

Newton, W. E. *An improved mode of, and apparatus for, feeding-in fuel to furnaces and fire-boxes.* (A communication.) Dated June 16, 1857. (No. 1681.)

This relates to a mode of introducing fuel from below. A moveable box is first brought forward by turning a crank and filled with fuel; then, upon turning the crank in the opposite direction, the box will be moved back until it comes beneath the open end of the fire-box or furnace, and by continuing to turn the crank a moveable bottom of the fuel chamber is raised by a lever, and the fuel is pushed up into the midst of the incandescent fuel in the furnace. The fuel chamber may then be brought forward again, until a perforated plate behind it is brought under the fuel to support the same like ordinary grate bars. The fuel chamber is then filled a second time, and so on.

Fowler, J., and W. Worby. *Improvements in ploughing or tilling land.* Dated June 16, 1857. (No. 1682.)

This relates to ploughing or tilling by steam power, and consists, 1st, in a method of constructing the carriages for carrying the pulleys which traverse along the headlands as the ploughing or tilling progresses, by attaching to the side of the carriage horizontal shares, which pass through the land with facility, but offer great resistance to being drawn vertically out of the ground; 2d, in a method of drawing forward these anchor carriages, as the work progresses, by mounting on the traversing plough a small drum, to which the traction ropes are attached in a peculiar manner; 3d, in a method of preventing the plough from rising out of the land in place of passing through it, by leading the traction rope over the end of the plough, so that when the strain comes on the rope it draws the end of the plough down; 4th, in an arrangement of the plough or tilling instrument, so as to allow of the ploughs, tynes, or cutters being bolted to the plates or bars at any required distance the one from the other; 5th, in a method of arranging the portable engine and winding apparatus, which is used for hauling the plough or tilling instrument, by combining with such an engine an additional winding drum, to assist in moving the engine in places where the land is uneven or bad.

Fowler, J., jun., R. Burton, and T. Clarke. *Improvements in the construction and arrangement of locomotive and other carriages, to facilitate their movement on common roads and other surfaces.* Dated June 16, 1857. (No. 1684.)

This consists in so arranging locomotive carriages, that the wheels on both sides of the carriage may, by means of certain tubular axles and bevel-wheels, be driven at different speeds, and therefore without interfering with the steerage of the carriage.

Ellis, J. *Improvements in apparatus to be used for decanting wine and other liquids, and for drawing corks from bottles.* Dated June 16, 1857. (No. 1686.)

Here a metal tray is used for receiving a wine bottle, and has a lip at one end in which the neck of the wine bottle rests. At this end also the tray is hinged to the end of a square basket of japanned metal, which contains it, and in it the bottle rests in an inclined position until it is wished to decant the wine, and then the tray is tilted by drawing up a handle to its free end.

Blaquiere, W. B., De. *Improvements in connecting the ends of submarine electric telegraph cables.* Dated June 16, 1857. (No. 1687.)

Here a tube of metal is used. At each end of it a part is made moveable on a hinge. The intermediate portion is filled with gutta percha, having therein wires suitable for forming, when connected with the ends of two parts of a cable, a continuous metallic circuit. Gutta percha is (whilst soft) pressed into the fixed portion

at each end of the tube, so as to join the insulating matter around the wire in the end of the cable, and cover the end of the cable itself. The moveable part of the tube is then shut down on the fixed part, so as to grasp the end of the cable, the interior of the grasping parts, and the outside of the cable, being made rough. The two parts of the tube are held together when shut, by screwing a nut over them.

GOULDING, R. *Improvements in the extraction of gold and silver and other metals.* Dated June 16, 1857. (No. 1688.)

The pulverised rock or ore is passed into and through cylinders or barrels, in which the chemical combination is induced by screw paddles or an ordinary screw propeller, forming a spiral screw delivery from end to end. The motion is favourable to the deposition of the heavy particles of metal in the state of amalgamation. The cylinder is constructed so as to permit the amalgam to subside through the quicksilver into a groove or recess connected thereto. The one is introduced beneath the mercury. The inventor proposes to apply heat to stimulate the chemical action, and to use the said heat upon the reverberatory principle, either by enclosing the cylinder in an outer case or jacket, or by covering only the lower part containing the quicksilver, the interval between being filled with heated water, air, or steam.

KÜRTEN, P. *An improved process of manufacturing mottled soap.* Dated June 17, 1857. (No. 1689.)

Having placed in one pan the tallow, palm oil, fat obtained from bones, &c., together with the cocoa-nut oil, the patentee dissolves the whole, and then boils with the addition of ley of caustic soda, until the mixture has acquired a sharp pungent taste. When the soap is sufficiently hard it is transferred to the frames and covered over. When cold it will have a mottled appearance. When colouring matter is to be used it must be boiled with the soap.

STURM, S., and H. E. BOUR. *Improvements in optical lenses and in machines for manufacturing the same.* Dated June 17, 1857. (No. 1692.)

The patentee claims the manufacture by mechanical means of lenses offering on one or on both sides a convex or concave cylindrical or any other curved surface, corresponding in all its points to the surface formed by the revolution of a given generatrix.

WHITEHEAD, J. H. *Improvements in pressing cloth.* Dated June 17, 1857. (No. 1694.)

These consist in pressing cloth wet between metallic plates instead of paper, and in boiling the cloth under pressure, giving it great solidity and firmness, and rendering it suitable for a substitute for leather without any stiffening or foreign body, and particularly applicable for cloth for setting wire cards for carding wool.

WARNER, F. *Improvements in supplying water to water-closets and other vessels.* Dated June 17, 1857. (No. 1695.)

Here the stem of the valve on the supply pipe has on it a piston with a cupped leather, and such piston works within a chamber closed at its outer end. The stem of the valve is hollow, so that water may flow through it to the chamber. On the interior of the chamber is a fixed wire, which enters into the hollow stem of the valve, so that as the valve is moved in order to open it, the stem thereof slides on the fixed wire, whilst at the same time the piston on the stem of the valve is forced into the chamber, the water in such chamber readily passing the cupped leather in one direction but not in the other, hence the valve will only close slowly according to the space allowed between the stem of the valve and the fixed wire on which it slides.

MARQFOY, G. *Improvements in actuating railway signals.* Dated June 17, 1857. (No. 1696.)

The object here is the working of railway signals by means of electricity. The signal is composed of a disc coloured differently on each side. This disc is mounted on a vertical axis, and on this axis there is a bevelled-toothed wheel, into which another bevelled-toothed wheel gears. These wheels are operated by a spring and lever, the position of the lever being altered by passing a current of electricity through the coils of an electro-magnet.

BRINSMEAD, H. *Improvements in machinery for dressing corn.* Dated June 17, 1857. (No. 1697.)

These refer to the adjustment of the parallel wires or bars of screens for separating the various sized grains or seeds, and can be applied to ordinary screens as well as to that known as Boby's patent screen. Wires oval in section, and capable of partially rotating, are employed. Also to the sieves of dressing machines, and consists in making the single sieves of different-sized openings, the largest openings being towards the "tail" end of the sieve, which allows the "chobs" or "whites" to drop through a sieve into a spout below.

NEWTON, A. V. *Improvements in machinery for forging nails and other articles.* (A communication.) Dated June 17, 1857. (No. 1699.)

The object here is to facilitate the forging of nails, &c., by imparting thereto swaging

blows in directions at or about right angles to each other alternately.

CLARK, G. P. *An improved safety-valve for steam-boilers.* Dated June 18, 1857. (No. 1701.)

Here the patentee places the valve within the boiler in an inverted position, whereby he is enabled to keep it pressed up against its seat by a spring more firmly and constantly to do its work, and he finds the action of the steam more effective on the valve from above downward through it, and out by means of a tube, than when otherwise set.

RALPH, T. L., and T. L., jun. *An improvement or improvements in the manufacture of metallic tubes.* Dated June 18, 1857. (No. 1702.)

This consists in manufacturing metallic tubes by rolling a billet or hollow cylinder with rolls, whose opposed grooves present a nearly lozenge-shaped figure, the billet being supported upon a mandril, having in transverse section a figure resembling that of the figure formed by the opposed grooves of the rolls as described, the tubes being made cylindrical, and finished by rolling and drawing.

WARD, T. *An improvement or improvements in the manufacture of strip and hoop iron.* Dated June 18, 1857. (No. 1703.)

This consists in piling the bars of iron to be manufactured by rolling into strip and hoop iron, so that by the use of any description of T shaped or other angle iron, the edges of the pile shall be covered by the T shaped or other angle iron.

CHARLWOOD, G. W. *Improvements in machines for mowing and reaping.* (A communication.) Dated June 18, 1857. (No. 1707.)

These relate, 1st, to the disposition of the pole of the machine, and to the application of an auxiliary wheel on a spring axle, whereby the machine is prevented from swinging about and pressing against the shoulder of the horse. 2. To the moveable cutters and to the stationary fingers or guards which admit of the moveable cutter being kept in close contact with the shear edge of the finger or guard whereby the cutting of wet or lodged grass can be readily effected. 3d. To disconnecting the gearing by means of a lever when the motion of the cutters is to be discontinued. 4. To the disposition of the driver's seat, by which the driver is enabled by a slight change of position to raise or depress the cutter beam. 5. With regard to the machine when used for mowing—to a small wheel furnished with ribs resting on a slightly slanting bearing, and placed at the outer end at the rear of the cutter beam, which wheel touches the ground with its inner edge and, when revolving, throws off the grass and forms a parting line between the cut and the standing grass.

DAY, H. H. *Improvements in preparing and vulcanizing india-rubber, gutta-percha, or other analogous gums.* (A communication.) Dated June 18, 1857. (No. 1702.)

This consists in mixing with the matter, when prepared for being vulcanized, a substance (such as pipe-clay) which will prevent the cellular and spongy character by absorbing the sulphurous acid gas as fast as it is generated.

SOREL, S. T. M. *New mechanical compositions, producing either house paintings, cement, or plastic paste to be moulded.* Dated June 19, 1857. (No. 1710.)

These compositions are obtained by combining the following substances in certain proportions:—chloride of zinc, a tartrate, muriatic acid, a feculent or amylaceous substance, water, and oxyde of zinc.

CHAMPION, J. *Improved arrangements of spindles and flyers, applicable to machinery or apparatus for preparing, spinning, and doubling fibrous materials.* Dated June 19, 1857. (No. 1711.)

This consists in various arrangements of spindles, flyers, and bobbins, in which the drag is placed in better positions than heretofore adopted. In one arrangement the patentee places the drag at the top of the bobbin. He also gives the drag to the flyer or to the spindle with which it is connected.

PINCOFFS, S. *Improvements in treating madder, munjeet, or any of their preparations.* Dated June 19, 1857. (No. 1712.)

These consist in mixing with madder, &c., spent madder, garancine, garanceux fatty or oily acids or their compounds, and, subsequently exposing the mixed materials to the action of stronger acids.

SPENCER, T. *Certain improvements in the purification of water and other fluid and gaseous bodies.* Dated June 19, 1857. (No. 1713.)

This relates—1. To the purification of water from any tinge of organic colour or deleterious gaseous body by treating it with an oxide of iron. 2d. To the purification of newly-distilled spirits by treating it with the above oxide.

JOHNSON, J. H. *Improvements in pressure gauges.* (A communication.) Dated June 19, 1857. (No. 1715.)

This relates to pressure-gauges for indicating the pressure of steam and fluids, whether as high or low pressure, or to be used as a vacuum gauge. According to one arrangement of gauge, a combination

of a piston and flexible diaphragm is employed, the piston being connected in an adjustable manner with a bow or hoop spring to counterbalance the steam or fluid pressure which is exerted against the opposite end of the piston. According to another modification, in place of the piston and diaphragm a helical spring, made wholly or in part of the form of a dome, is formed, and this spring is combined with a capsule of india-rubber of a similar shape to the spring. This capsule is placed either in the interior or on the exterior surface of the spring, and is consequently extended or contracted with it.

DAY, H. H. *An improved method of treating or purifying gutta-percha.* (A communication.) Dated June 19, 1857. (No. 1717.)

This consists in submitting the gutta-percha to the action of a liquor which dissolves out the etheric oil, and at the same time, by acting upon the woody matter, disengages the sand and other foreign matters held therewith. The liquor is composed of one pound of caustic potash (hydrate of potassa) dissolved in two gallons of water, and to this is added an ether formed from a solution of chloride of lime in alcohol.

GARRETT, J. D. *An improved construction of horse hoe.* Dated June 19, 1857. (No. 1718.)

The patentee claims suspending the mortice bar of horse hoes by means of pendant rods or expanding levers, which, as their angle of inclination is changed by the rotation of screws or their equivalent, will raise or lower the bar, and thereby adjust the holes to the required angle for entering the ground.

NEWTON, W. E. *Improvements in the construction of railway crossings.* (A communication.) Dated June 19, 1857. (No. 1719.)

This consists in a method of combining a flexible rail, which is fixed at one end, with a fixed rail and point. The elasticity of the moveable rail is made to keep it in its place and still permit of its yielding sufficiently to allow the flange of the wheel to pass. It also consists in placing a stop opposite to the point of the crossing, for the purpose of supporting the rail at that point.

KIRK, E., J. LEADBETTER, and C. WILSON. *Certain improvements in the manufacture of trunks, boxes, and other similar depositories.* Dated June 20, 1857. (No. 1721.)

These relate—1st. To strengthening the lids of metallic trunks, &c., by forming such lid in a succession of angles, the intermediate surfaces between which being either plain or curved. 2d. To fastening the sides of the box together at the corners of the box, and consists of so cutting the metal of each of the sides that a projecting piece may remain on each to overlap and be rivetted or soldered to the side abutting against it. 3d. To forming the bead or rib usually employed at the upper edge of the box, and upon which the lid closes, by bending over the metal of the side, and turning or swelling the same out into a hollow rib or bend.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

EDWARDS, W. A. *Improvements in apparatus for separating iron and other matters from ores and other substances.* Dated June 16, 1857. (No. 1683.)

A cylinder of iron is rendered magnetic by parts of its length revolving within a fixed coil of wire in connexion with a galvanic battery. The pulverised ores, &c., are placed in a hopper, the lower end of which admits the ore to flow freely as the cylinder revolves under the hopper. Those parts of the ore which adhere to the cylinder will be carried round therewith, whilst those not attracted descend into a receiver below. As the parts of the cylinder having iron adhering thereto come again under the hopper, a brush brushes it off into a receptacle.

BOUSFIELD, G. T. *Improvements in the construction of wheels and axle-boxes.* (A communication.) Dated June 16, 1857. (No. 1685.)

Each spoke is of two parts (one metal, the other wood), joined at their outer ends. The lower or metal end has a socket to receive a screw, and the outer end of such screw enters a recess on the inside of the felloe at the joint. The end of a spoke is formed with a wedge and screw, and entering between the inclined ends of the parts of the felloe, presses them apart, and expands the felloe. The main end of each spoke is fixed to central plates by flanges on the plates, which enter in the inner ends of the spokes. Other modifications are included.

SMITH, J. *Improvements in the manufacture of woven fabrics.* Dated June 17, 1857. (No. 1690.)

This relates particularly to the manufacture of pile goods, such as tabby velvets, velveteens, &c., and all kinds of goods that have the pile to be cut parallel with the selvages of the cloth, which is afterwards fired or shorn, and consists of forming a race and cord, or rib alternately at right angles with the selvages, which ribs or

cords may be varied in size and variety at pleasure.

HODGSON, W. and H. *An improved lubricator or oiler by means of force-pumps or valves.* Dated June 17, 1857. (No. 1691.)

This consists of a covered cup or basin constructed of tin, with a piston valve and piston rod attached. At the bottom of one side of the piston is a small hole leading into a tin pipe annexed to the outer side of the cup or basin. The said pipe is curved at the top, so as to enable the lubricating material to drop upon the bearings of the machinery, and the cup or basin is to be placed in such a position near the bearings that, when the lubricating material drops from such bearings, it may fall into the cup or basin, and be again forced up the pipe by the piston.

HOSCH, H. *An improved shirt-cutting machine.* (A communication.) Dated June 17, 1857. (No. 1693.)

This machine consists of a number of tools (according to the sizes of shirts required) fixed upon a plate of iron. They have the form of the pieces they are intended to cut, and are fixed by screws, and if one breaks it may be replaced separately.

RANSOME, F. *Improvements in moulding plastic materials.* Dated June 17, 1857. (No. 1698.)

This consists in the use of moulds made of thin metal, in which the pattern is produced by stamping.

HIBBERT, H., and H. RICHARDSON. *Improvements in finishing or polishing yarns or threads.* Dated June 17, 1857. (No. 1700.)

This relates, 1st, to a method of applying heat to yarns or threads during the process of polishing or finishing by means of a peculiar form of gas-stove. 2d, in the employment of a cylindrical surface running in contact with the heated yarn or thread, or employed at the natural temperature. 3d, to a method of distributing the size, &c.

SYKES, E., and M. W. CRAWFORD. *Certain improvements in the construction and arrangement of the pans or vessels, and the furnaces and flues, to be employed for the purposes of soap-boiling, tallow-melting, bone-boiling, dreg-boiling, and other similar offensive processes.* Dated June 18, 1857. (No. 1704.)

The object here is to carry off the offensive exhalations arising during the processes of boiling soap, &c., and for so conveying away the effluvia that the unconsumed combustible portions thereof may be usefully employed in economising fuel, and the pans, flues, &c., are peculiarly constructed for that purpose.

THOMPSON, W. J. *Improvements in machinery for preparing small coal and other matters to be used as fuel.* (A communication.) Dated June 18, 1857. (No. 1705.)

The small coal, &c., is fed on to the heated bed of a crushing and mixing mill. The upper part of a vertical axis passes into the enclosed chamber above the heated bed or bottom. This axis gives motion to several arms, to one of which a scraper is affixed, which moves the coal and other matters on the heated bed of the mill. The other arms carry a mixing roller and crushing rollers. There is an opening through which the contents are discharged; and also a charging opening. The materials are next delivered into a hopper, from the lower part of which they fall into recesses formed on two wheels, and as each wheel has alternately projections and hollows, the projections of one wheel enter the hollows of the other wheel, and compress the materials therein. The moulded masses are forced laterally out of the hollows or recesses by two rams put in motion by suitable gearing, and such compressed masses are received on two endless aprons which convey them away from the machine.

BARTON, J. E. *An improvement in winding worsted on to creel bobbins of carpet-looms.* Dated June 18, 1857. (No. 1706.)

This consists in arranging the machinery to wind worsted from the skein on to creel bobbins, without the surgling machinery, thus dispensing with the surgling and the spools or large bobbins.

DAY, H. H. *Improvements in the manufacture of elastic fabrics.* Dated June 18, 1857. (No. 1709.)

This consists in uniting two woven fabrics together by means of a solution of india-rubber, or of a sheet of rubber placed between them, and passing the same between pressing rollers.

HILL, J. *Improvements in the permanent way of railways.* Dated June 19, 1857. (No. 1714.)

The object here is to produce a form of rail to be fixed without chairs, the head of which can be replaced when worn out at a much less cost and trouble than the ordinary rail; also a new form of rail which does not require wooden sleepers.

JAEGER, H. *Improvements in looms for weaving.* (A communication.) Dated June 19, 1857. (No. 1716.)

This consists in adapting to the warp beam of looms, certain eccentrics, cranks, and other apparatuses for maintaining the warp at an equal tension.

PROVISIONAL PROTECTIONS.

Dated February 18, 1858.

308. William Henry Crispin, of Marshgate-lane, Stratford, copper smelter. Improvements in the construction of bearings, beds, and sockets for axles, shafts, pivots, and other rotating parts of machinery.

310. George Claridge, of Pontypool Iron Works, Monmouth, furnace manager, and Richard S. Roper, F.G.S., F.C.S., of Ebbw Vale Iron Works, agent. An improved mode of manufacturing coke.

312. John Chadwick, of Glasgow, engraver. Improvements in machinery or apparatus for engraving or producing printing surfaces.

314. Frederick Jones, of Manchester, brush maker. Certain improvements in machinery or apparatus for cutting "piassava," or other fibrous substances employed in the manufacture of brushes, which said improvements are also applicable to other purposes of cutting.

Dated February 19, 1858.

316. William Riley, of Liverpool, engineer. An improved method of raising and lifting water from the bilge or holds of ships and other vessels, and in a peculiar construction and arrangement for effecting the same.

318. James Champion, of Manchester, machine maker. Improvements in spinning cotton, silk, flax, wool, and other fibrous materials.

320. Edwin Maw, of the Doncaster Iron Works, Yorkshire. Improvements in the manufacture of iron wheels.

322. Isaac Brown, of Carlisle, and John Brown, of Notting-hill, merchants. Improvements in machinery or apparatus for reducing bones.

324. William Skallitzky, of Vienna, manufacturer. Improvements in the manufacture of socks and stockings.

Dated February 20, 1858.

326. William Edward Nethersole, of Swansea, carriage superintendent. Improvements in the construction of parts of railway carriages.

330. Henry Edwards, of Bishopsgate-street. Improvements in stoppers for feeding bottles and other vessels.

332. Thomas Green, of Leeds, mowing machine maker. Improvements in mowing machinery.

334. William Greene, of Merlin's-place, Clerkenwell, house decorator, and Mathew Charles Greene, of Hatton-garden, wholesale optician. Improvements in joining soft metal pipes.

336. Abraham Myers, of Hutchinson-street, Gravel-lane, Houndsditch, cap-manufacturer. Improvements in the manufacture of caps or coverings for the head.

340. William Betts, of Wharf-road, City-road, capsule manufacturer. A new manufacture of glazed or enamelled paper.

Dated February 22, 1858.

342. John Davis, of Queen's-road, Dalston, professor of music. Improvements in cornets and other wind musical instruments.

344. Walter Hall, of Erith, Kent, manufacturer. Improved apparatus for working railway breaks.

346. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., Editor of the *Mechanics' Magazine* and Patent Agent. Improvements in machinery for effecting the amalgamation of precious metals. A communication.

Dated February 23, 1858.

348. Francis Puls, of Haverstock-hill, chemist. The manufacture of certain hydro-carbons.

350. William Johnston, of Glasgow, merchant. Improvements in apparatus for regulating or controlling the flow or passage of fluids.

352. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., Editor of the *Mechanics' Magazine* and Patent Agent. Improvements in apparatus for separating substances of different specific gravities. A communication.

354. Edward Toynbee, of London, engineer. Improvements in the manufacture of manure.

356. James Boydell, of Gloucester-crescent, Camden Town. Improvements in locomotive carriages.

Dated February 24, 1858.

358. Alfred Charles Hobbs, of Cheapside. A domestic bell telegraph.

360. Edward Borlase, of St. Just, near Penzance, mining engineer. Improved apparatus for separating metals and metallic ores from other mineral substances.

362. James Henderson, of Glasgow, engineer. Improvements in shells or explosive projectiles.

364. Charles Kaye, of Lockwood, York, waggon builder. Improvements in couplings for connecting and disconnecting waggons and other carriages on railways.

366. Alfred Vincent Newton, of Chancery-lane. Certain improved means of relieving the slide valves of steam engines of unnecessary friction. A communication.

368. Alfred Vincent Newton, of Chancery-lane. A mode of varying the length and reversing the direction of the throw of an eccentric, applicable to the reversing gear of locomotives and expansion gear of other steam-engines, and to other purposes. A communication.

372. Augustus Applegath, of Dartford, Kent. Improvements in printing machinery.

Dated February 25, 1858.

373. William Tatham, of Rochdale, machine maker. Improvements in machinery, or apparatus for lubricating the pistons, piston-rods, cylinders, and other parts of steam or other engines, and which is applicable to other purposes where lubricating matter is required.

374. John Arnold, of Newton Moor, near Hyde, Chester, engineer. Improvements in metallic pistons.

375. John Bowen Barnes, of Summer-lane, Birmingham, cruet-frame manufacturer, and John Loach, japanner, of Caroline-street, Birmingham. Certain improvements in apparatus for descending and ascending the shafts of mines or other deep pits, the descent and ascent of which imperils the lives of the miners or others employed therein.

376. James Templeman, of Dunfermline, chemist. Improvements in the manufacture or production of artificial fuel.

377. William Slater, of Bolton-le-Moors, manager, and Samuel Smith, of the same place, foreman. Improvements in machinery to be used in turning and cutting metals.

379. John Talbot Pitman, of Gracechurch-street. Improvements in hand lever self-inking printing presses for printing cards, envelopes, bill-heads, and other articles. A communication from S. J. Smith, of New York.

380. Alfred Vincent Newton, of Chancery-lane. Improved machinery for grinding and polishing glass, stone, metal, and other substances. A communication.

381. Lazare Prosper Lambert-Alexandre, of Paris. Improvements in apparatus and signals for preventing accidents on railways.

Dated February 26, 1858.

382. James Morison, sen., and James Morison, jun., of Paisley, machine makers. Improvements in Jacquard apparatus used in weaving.

383. William Compton Smith, of Lincoln's-inn-fields, solicitor. Improvements in the manufacture of envelopes for letters, and other purposes. A communication.

384. William Chadwick, of Bury, Lancaster, tin plate worker. Improvements in ventilators.

385. Herbert Mackworth, of Clifton, Gloucester. Improvements in the separation, raising, and lowering of coal and other minerals, and in coking, and in apparatus connected therewith.

Dated February 27, 1858.

387. Stanislas Hoga, of Nassau-street, gentleman. Improvements in applying power in locomotion, by which a given force may, in its effect of overcoming resistance, be increased and multiplied.

388. James Knott, of Oakley-street, Lambeth, glass manufacturer. An improved feeding bottle.

389. Joseph Theodore Raymond and Alphonse Lambert, of Caledonian-road. Ornamenting textile fabrics.

391. Luigi Galli, of Milan, Italy. A process of superseding wood engraving, which he calls Gallitypy.

392. William Cave, of Rathbone-place. Improvements in apparatus for propelling vessels, carriages, and machinery.

393. Michael Henry, of Fleet-street. Improvements in electro-magnetic motors. A communication from Messrs. Grenet and Vavin.

394. William Armand Gilbee, of South-street, Finsbury. An improved union joint for gas, water, and steam pipes, also applicable to the branch pipes of fire-engines. A communication.

395. William Armand Gilbee, of South-street, Finsbury. Improvements in the branch pipes of fire-engines or pumps. A communication.

396. William Clark, of Chancery-lane. Improvements in preparing paper for, and in obtaining photographic proofs or impressions. A communication from M. Niepce de St. Victor of Paris.

Dated March 1, 1858.

397. James George Newey, and William Millars Newey, of Birmingham, manufacturers. Improvements in fastenings, especially for or applicable to wearing apparel and purposes where a spring connexion or adjustment is desirable, in arranging for sale, and packing fastenings and ornaments, and in ornaments for personal wear.

399. Anton Von Schuttenbach, of St. Petersburgh. An improvement in treating fatty and oily matters.

400. John Hadfield, of Chelmsford, manufacturing chemist. Improvements in the manufacture of manure and other products, when treating sewage matters, and in the manufacture of colours.

401. John Kingsford Field, of Upper Marsh, Lambeth. Improvements in lamps. A communication from Anton Von Schuttenbach, of St. Petersburgh.

402. David Greenley, of Upper Cumming-street, Pentonville, artesian well borer, and Thomas Barnabas Daft, of Bedford-street North, Liverpool, engineer. Improvements in machinery for boring for water or for other purposes.

403. Henry Mortimer Platt, of New York, gentleman. Improvements in ploughing and tilling land.

404. William Edward Newton, of Chancery-lane. Improved machinery for removing burrs and other extraneous substances from wool or skins. A communication.

405. William Edward Newton, of Chancery-lane. Improvements in the treatment or preparation of maize or Indian corn, previous to grinding the same into flour. A communication.

406. John Billing, of Abingdon-street, Westminster, architect. An improved throat and door for chimneys and flues.

Dated March 2, 1858.

407. John Skelly, of Kilcurry, Ireland, coachbuilder. Improvements in carriage springs.

408. Jonathan Burcumshaw, of Lenton, Nottingham, lace dresser. Improvements in machinery for dressing lace made of silk, cotton, or other material.

409. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., Patent Agent. An apparatus for separating substances of different specific gravities, and for washing sands and earth. A communication from Alphonse Prestel.

410. Abraham Ripley, of Alfred-place, Newington Causeway, engineer. Improvements in machinery for rolling and polishing leather, and tanned or untanned hides.

411. John Henry Johnson, of Lincoln's-inn-fields. Improvements in surcharging or regenerating steam, and in the application of the same to steam-engines. A communication from J. J. G. Collins, W. A. Rhodes, and T. Drake, of Philadelphia.

412. William Hooper, of Mitcham. Improvements in the manufacture of buffer and other springs when vulcanized india-rubber is used.

413. Alfred Vincent Newton, of Chancery-lane. An improvement in the process of manufacturing soda and potash. A communication from M. le Chatelier, of Paris.

414. William Spencer Driggs, of New York, gentleman. Improvements in pianofortes. A communication from S. B. Driggs, of New York.

Dated March 3, 1858.

415. Edward Henry Cradock Monckton, of the Parthenon Club, Regent-street. Improvements in distilling and rectifying, and in the apparatus to be employed therein.

417. Paul Joseph Gautrot, civil engineer, of Paris. Instantaneous tents, invented purposely for the use of public vehicles called omnibuses, but which can be also applied to any others, open vehicles, carts, or waggons, and travelling hawkers, at a very low cost; new system of shelter against the inclemency of the weather.

419. Benjamin Parker, of Hammersmith, surveyor. The manufacture of materials for coating, cementing, bedding, and otherwise protecting bodies, and which are also applicable to the construction or formation of various articles.

421. William Scoble, foreman of gas works, Bow Common-lane, Mile End. Arranging the retorts, furnaces, flues, communications, and connexions, for the more economical manufacture of gas, and by which arrangement the generative heat may be obtained from either coal, coke, tar, or other similar combustible substances.

423. William Henry Graveley, of Upper East Smithfield, engineer. An apparatus for purifying sea and other mineral waters, and rendering them fit to drink.

425. George Arthur Biddell, of Ipswich. Improvements in machines for cutting vegetable and other substances.

PATENTS APPLIED FOR WITH COMPLETE SPECIFICATIONS.

422. George John Parson, of Adelphi-terrace, Strand, gentleman, and Thomas Pilgrim, engineer, of Bow. Improvements in the mode of raising the temperature of steam generated in steam boilers, and using the same for working steam-engines. Dated March 3, 1858.

436. Charles Eyland, of Walsall, Stafford, manufacturer. An improvement or improvements in certain descriptions of buckles. Dated March 4, 1858.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," March* 16, 1858.)

2792. H. K. Sweet. Improvements in photographic portraits and pictures. A communication.
2806. G. R. Simpson and D. C. Simpson. Improvements in spring blinds.
2811. J. J. Cousins. Improvements in the construction of steam ploughs.
2812. H. Hochstaetter. An improved machine for the manufacture of matches.
2830. J. Pinker. Improvements in governors for marine steam engines.
2834. W. J. Elwin. Improvements in night lights.
2838. C. E. Lacointe. A new mode of advertising.
2855. S. Webster. Certain improvements in machinery or apparatus for turning.
2856. W. Picking. An improved method of, and apparatus for feeding steam boilers with water.
2864. G. P. Wheeler. Improvements in the préparation of materials for the manufacture of paper pulp or half stuff.
2879. J. Gedge. Improved means for stopping or retarding carriages used on ordinary roads. A communication.
2884. R. A. Brooman. The manufacture upon circular frames of a fabric suitable for petticoats and other garments, and curtains and other articles of furniture, together with apparatus to be employed therein. A communication.
2887. E. D. Johnson. An improvement in the construction of fuzee watches.
2904. W. Clay. Improvements in metal knees employed in the construction of ships, buildings, railway or other waggons or carriages, or other analogous purposes.
2905. W. Clay. Improvements in the points, switches, and crossings of the permanent way of railways.
2933. A. V. Newton. Certain improvements in sewing machines. A communication.
2937. J. Schloss. A so-called Diana Lock, or improved fastening.
2958. S. B. Wright and H. T. Green. Improvements in apparatus used in the manufacture of bricks, pipes, and tiles.
2961. A. Vandeleur. Improvements in the construction of fire-places and passages for air of air furnaces, by which (without machinery) the intensity of the fire is increased, a saving of fuel effected, and the smoke consumed.
2964. A. A. Chassepot. Improvements in breech-loading fire-arms.
2968. F. G. Grice. New or improved machinery for the manufacture of bolts, spikes, rivets, screw-blanks, and other articles of like manufacture.
2980. J. B. Couy. Improvements in the manufacture of manure, and for the disinfection of animal and vegetable matters.
2988. J. Summers and D. Wormald. Improvements in machinery for manufacturing clog-irons and heels and tips for boots or other coverings for the feet.
3012. T. W. Willett. Improvements in the manufacture of gunpowder, and in the machinery connected therewith.
3150. A. F. Kynaston. An improved slip or disengaging hook.
122. W. Weild. Improvements in machinery for winding yarn or thread on to bobbins, spools, cards, or other similar surfaces.
147. A. Bird. A new or improved spring platform or mattress for bedsteads and other articles used for sitting, lying, or reclining upon.
184. R. A. Brooman. Improvements in burners for generating and burning gas from hydro-carbon fluids. A communication.
260. G. W. Burton. An improved method of manufacturing white lead. A communication.
301. G. Baker and J. E. Baker. New or improved machinery for compressing and moulding powders and pastes.
312. J. Chadwick. Improvements in machinery or apparatus for engraving or producing printing surfaces.
350. W. Johnston. Improvements in apparatus for regulating or controlling the flow or passage of fluids.
357. W. E. Newton. An improved process for producing photographic pictures or designs on the surface of stone or metals, so that impressions may be taken therefrom by the process of lithographic printing. A communication.
359. S. Smith. Improvements in apparatus for insuring the correct action of the safety valves of steam boilers.
376. J. Templeman. Improvements in the manufacture or production of artificial fuel.
404. W. E. Newton. Improved machinery for removing burrs and other extraneous substances from wool or skins. A communication.
422. G. J. Parson and T. Pilgrim. Improvements in the mode of raising the temperature of steam generated in steam boilers, and using the same for working steam engines.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

534. Samuel Cunliffe Lister.
538. Samuel Cunliffe Lister.
555. James Murdoch Napier.
567. Benjamin Goodfellow.
568. Robert Neale.
570. William and John Galloway.
571. Jonas Marland.
572. Edward Vincent Gardner.
574. Edmund Johnson Mitchell.
584. Robert More Butt.
591. William Hill.
662. George Allam Barrett, William Exall, and Charles James Andrewes.
749. Frederick Joyce.
768. Robert William Waithman.
1207. Thomas Waterhouse.

LIST OF SEALED PATENTS.

Sealed March 12th, 1858.

2372. Nicholas Fisher.
2374. Charles Watson.
2378. James Leeming.
2379. William Gossage.
2381. Theophilus Marsh.
2387. Richard Shiers, jun.
2388. John Ashby.
2390. Thomas Grahame.
2397. Richard Wicks.
2399. Abram Seward and Charles Seward.
2400. Charles William Lancaster.
2402. John Hathornthwaite Winder.
2403. William Middleton, jun., and Thomas Tertius Chillingworth.
2414. William Smith.
2417. John May Munro, jun.
2420. Charlotte Delevante.
2445. George Schaub.

2667. Victor Péan.
2841. John Thomas Way.
2994. John Fowler, jun., and William Worby.
3131. Francis Taylor.
3175. James Cottrill.
3177. Isaac Holden.
3182. Victor Mourot.
32. Samuel Lees.
62. James Broadley.
70. Marc Antoine François Mennons.

Sealed March 16th, 1858.

2411. Isaac Louis Pulvermacher.
2421. Samuel Whitehead.
2422. Samuel Faulkner.
2425. Thomas Wilson.
2426. David Lichtenstadt.
2437. William Henry James.
2441. Henry Ormson.
2453. Meinrad Theiler.
2458. George Rennie.
2472. Thomas Saunders.
2509. John Henry Johnson.
2512. James Paisley and George Bertram.
2530. George Webster Shibles.
2535. Robert Green.
2541. William Edward Newton.
2552. James Combe.
2820. William Macnab.
3172. James Boydell.
3181. Alexander Parkes.
5. Alexander Parkes and Henry Parkes.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICE TO CORRESPONDENTS.

Several letters have been received, and will be either inserted or noticed in our next.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

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Mechanics' Magazine.

No. 1807.] SATURDAY, MARCH 27, 1858. [PRICE 3D.

Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London.

BROWN, LENOX, AND CO.'S PATENT SIGNAL BUOYS.

Fig. 1.

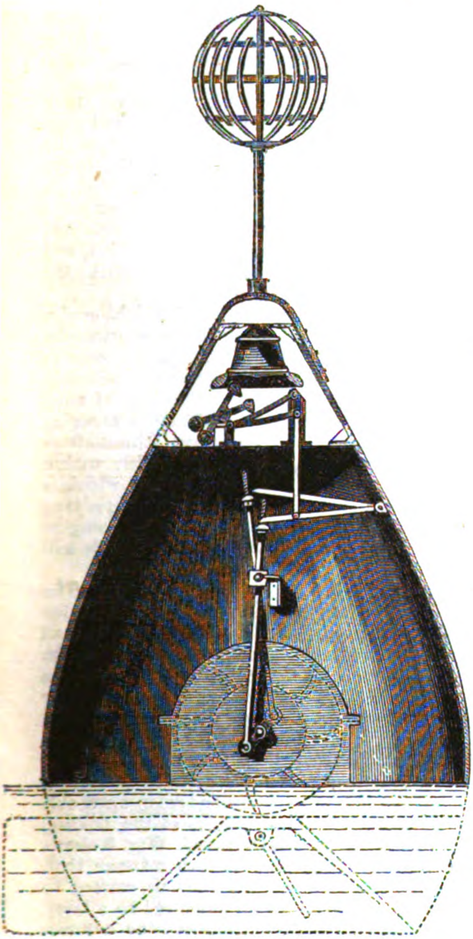
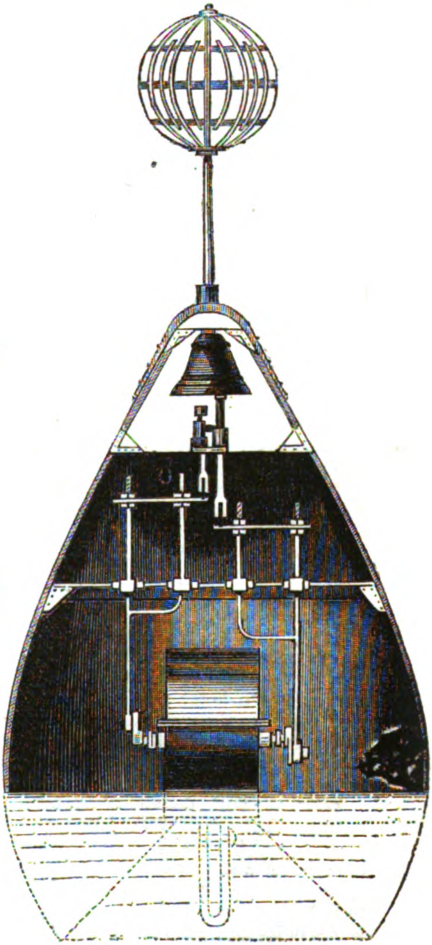
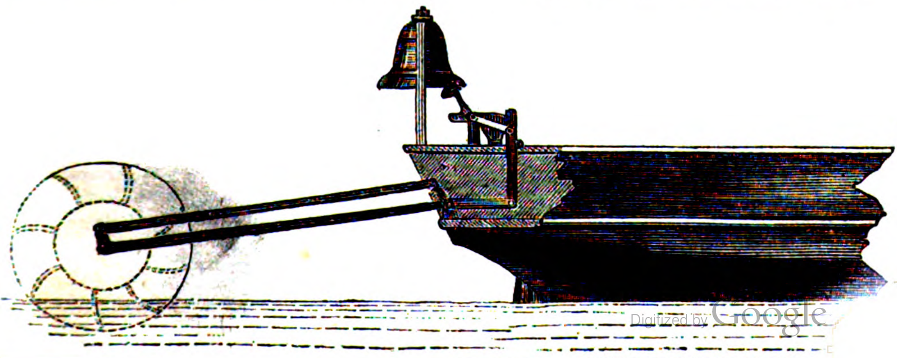


Fig. 2.





BROWN, LENOX, AND CO.'S PATENT SIGNAL BUOYS.

EXPERIMENTS have lately been made on the Thames, at Millwall, with a patent buoy so constructed as to give forth a continuous peal of sounds when placed in a tide-way or other current of water, and as some of the inhabitants of Deptford, on the other side of the water, found it necessary to request the discontinuance of the experiments, we may presume that the results obtained were quite satisfactory. We have also other reasons for knowing this to be the case. The buoy is the invention of Mr. Lenox, the enterprising representative of the well-known firm of Brown, Lenox, and Co., Chain Cable and Anchor Works, Millwall.

In constructing buoys, floating-lights, and other floating bodies anchored at sea, they are made according to this invention with keels, or in such manner that they will turn with the tide; and through or under such floating bodies passages are formed below the line of flotation through which passages the water will flow, and within which the lower parts of undershot wheels are applied. On the axis of the water-wheels are cranks which give motion to rods which pass through guides near their upper ends. At the upper parts of such floating bodies are fixed bells, the hammers of which are mounted on weighted levers, and as the upper ends of the connecting rods are raised they come under, lift, and pass the tail ends of the hammer levers, which, descending by their weights, strike the bell.

Figs. 1 and 2 of the engravings on the preceding page show two sections at right angles to each other of a buoy having apparatus constructed and combined on the new principle. The form of the buoy may be varied; the interior is constructed, however, in each case so as to enclose sufficient space to give the flotation required, and yet leaving space sufficient for receiving the mechanism suitable for carrying out the invention. The form of buoy shown in the figs. mentioned is similar to what has been before made where the mooring is at the upper end of a conical space formed on the underside of the buoy. The shaft or axis of the water-wheel turns water-tight in bearings at the side of the chamber within which the water-wheels turn. At each end of the shaft is fixed a crank, to which is attached a connecting rod, operating levers, &c., which strike the bell. By thus applying bell apparatus to a buoy there will at all times be a constant ringing of the bell so long as the water is flowing through the channel, and thus in the case of fogs or mists signals will be constantly given.

The apparatus for giving motion to the hammers of a bell may be greatly varied. The patentee sometimes adopts another form of buoy, with apparatus suitably arranged for acting by means of floats on the levers on which the hammer heads are mounted. The bell in this arrangement is, as in the former buoy, hung in an open space or channel formed in or upon the upper part of the buoy. There are also two floats which work within chambers formed at the lower part of the buoy; the stems of these floats rise up through tubular passages. On the upper ends of the stems or rods are catches, which, on rising, come under levers on which the hammer heads are mounted, and lift the same, by which the hammer heads are moved from the bell, and, when the catches rise beyond the ends of the levers, the levers will fall and cause the hammers to strike the bell.

When the floats descend, the catches will pass the ends of the levers and again open out, so as to lift the ends of the levers when the floats again rise. The form of the floating vessel to which such-like apparatus might be applied may be greatly varied. Fig. 3 shows the stern of a ship or other vessel having apparatus applied thereto in such manner that, by the use of a water-wheel floating on the surface of the water, and which is caused to turn by the flow of the tide or current, motion is given by a connecting rod to a lever, which in its turn gives motion by a catch to the end of a lever, which carries the hammer heads as shown. The catch and lever, with the link, are arranged to cause the catch to act in its upward motion and to pass the end of the hammer lever in its downward motion.

The efficiency of the improved bell-buoys having been established by the late trials, it only remains, we believe, to perfect the construction in a few details, after which the invention will be brought into general use. With the Thames tide, twenty-five clear, distinct strokes of the bell per minute were obtained.

PAUL'S PATENT RAILWAY SIGNALS.

Mr. W. Bond Paul, of Langport, Somerset, has patented an invention which consists in placing along a line of railway, and at such distances from each other as may be found desirable, electro magnets fixed near to the rails, and which, when in action, on the passing of a train, attract a lever attached to the engine, and so placed as to be brought near to the poles of the magnets. This lever, being drawn towards the magnets, on coming within their influence, opens a communication between the steam reservoir of the engine and a whistle. At the station which the trains run from a galvanic battery is placed, and from this battery proceed two wires to the next station—one from the positive, and the other from the negative pole. One of these wires passes around or communicates with all the electro-magnets in succession, and, consequently, if the circuit be completed—which may be readily done at any part of the line by placing an electric conductor in contact with the two wires—those electro-magnets which are between the points of contact and the battery are at once rendered operative.

The invention is susceptible of various modifications, some of which are described in the patentee's specification. The accompanying engravings illustrate one method of carrying the invention into effect. Fig. 1 is a side view of an engine, to which

Fig. 2. Fig. 3.

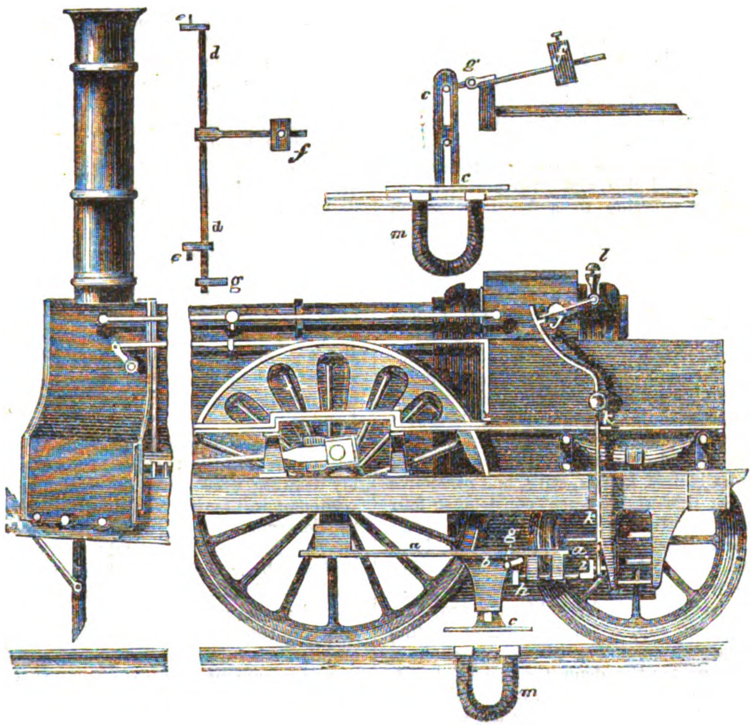


Fig. 1.

are attached two bars, *a*. From these depend blocks, *b*, on the inner side of which slide the armatures, *c*, vertically upwards and downwards, the blocks and armatures being connected by pins working in grooves. These blocks, *b*, also carry the cross axis, *d*, shown separately in Fig. 2, and on which are two crank pins, *e*, *e*, moved by the armature, *c*, whenever it is attracted downwards, and when the engine has passed the attracting magnet, these pins again lift the armature, *c*, by means of

the balance weight, *f*. When either of the pins, *e*, *e*, is drawn down by its armature, it thereby raises the opposite arm, *g* (Figs. 2 and 3), which was previously lodged in the snail, *h*, to prevent the latter turning, and to keep up the crank pin, *i*, which, by means of the rod, *k*, holds up the heavy arm, *j*. But the raising of the arm, *g*, by the depression of the armature, *c*, as just described, liberates the snail, *h*, and allows the rod, *k*, to descend. The heavy arm, *j*, is thus allowed to fall and open the whistle, *l*. *m* is the electro-magnet employed for the purpose described.

THE BRAZILIAN NAVY.

The advances made of late years by the Brazilian Empire, under the enlightened Government of Don Pedro II., well deserves the attention of the mechanics and men of science in this country. The steady improvement of the Imperial navy, in particular, is worthy of their consideration, and may be observed, not only in the increased number of vessels built for that navy in England and France, but also in the extension of the resources of the Government at Rio Janeiro, Bahia, and other ports.

Before referring to a few facts which have come under our own notice, it may not be amiss to allude to those mentioned in an excellent work upon Brazil, recently published by two American missionaries, who have long been resident in that magnificent country. Not far from Praia Grande, they tell us, is the foundry, engine manufactory, and shipyard of Ponta d'Arêa, where four or five hundred mechanics and labourers, under European and Brazilian supervision, are turning out works of importance and magnitude. In the year 1854, besides boilers, kettles, stills, and other like articles, this establishment constructed four steamers with their engines; and two steamers and a bark, in addition, were laid down upon the stocks. From the same source we learn that in the city of Bahia a Company has just been formed for the provision of a patent slip, a jetty capable of coaling the largest steamers, bonded warehouses, and stores for the deposit of coal. Lieut. Robert Grundy, C.E., has been nominated by the Board of Directors to act as Manager, and the works are to be commenced forthwith and carried on with activity.

From the *Jornal de Commercio*, published at Rio de Janeiro, on the 3d of January last, we learn that a splendid steam yacht, for the service of the Emperor, has just been completed. This yacht was designed by Mr. Level, the chief constructor of the Government works, and built at the establishment at Ponta d'Arêa, under the supervision of Sr. Corrêa de Aguiar. She is fitted with a pair of Penn's oscillating engines, and appears to be in all respects an efficient and elegant vessel.

At the present time there are building in England eight, and in France two, gunboats for the Brazilian service. Of these, four are at Mr. Pitcher's yard, Northfleet; four at Messrs. Green's, Blackwall; and the remaining two at the yard of Mr. Norman, of Havre. Those at Northfleet we have lately inspected, and could not fail to observe that, while the Brazilian Admiral in charge of them has not been slow to avail himself of the good features of the gunboats built by the British Government, he has not, on the other hand, failed to introduce novel improvements of his own or others which have recommended themselves to his adoption. The most noticeable change which we remarked was the apparently enormous space appropriated to the shot, shell, and powder magazines. These in the *Ibicuy* and *Itajahy*—the two most forward vessels—certainly seem to indicate that the chief object has by no means been lost sight of; and as these craft are very likely to be on active service for long periods on the vast rivers of Brazil, far from their resources, their designer has, doubtless, displayed proper foresight in this arrangement. Each of these gunboats is of 400 tons burden, builder's measurement, is fitted with 80 h.p. trunk engines by Penn, and carries 2 pivot 68-pounders, and 4 broadside 32-pounders. The rudders are worked by a patent steering apparatus, the invention of Mr. John Graham, of London.

We cannot conclude this short paper without remarking that the time is probably drawing near when the Brazilian Government will be in a position to supply all the demands of its navy from its own dockyards. Timber is plentiful in Brazil, and skilled labour is yearly becoming more easily obtainable. For several years past there have been a few young native officers studying the science and practice of naval architecture in this country, and although our Government steadily refuses their applications for the same facilities of study in our Royal Dockyards as are constantly accorded to the officers of the tyrannical Governments of Europe—Russia, Austria, &c.,—yet we are able from our own knowledge to state that some, at least, of these young Brazilian gentlemen have gained a careful and comprehensive knowledge of the art of ship-building, and have fully succeeded in fitting themselves to conduct

the business of their own dockyards. Of course English ship-builders will have ultimately to bear the loss resulting from the withdrawal of Brazilian orders; but we cannot on that account refrain from wishing every success to the enterprises of a Government so just, so intelligent, and so progressive as that which now guides the destinies of the Brazilian Empire.

ELECTRIC TELEGRAPH CABLES.

We feel it incumbent upon us to direct attention to the following facts:—Mons. Baudouin has recently forwarded a paper to the Academy of Sciences on Submarine Cables, in which he remarks that in a communication addressed to the Academy some months ago, he stated that instead of making a submarine cable solid and heavy it should be made of small diameter and light weight. Hitherto, he continues, a certain number of copper wires have been covered with insulating materials and then placed in a common insulating envelope, which thus forms the inside of an iron wire cable. It is evident that all the resistant strength of the cable is in the iron-enveloping wires; but, however strong this metallic covering may be, it will stretch considerably under great strain, and break the electric wires inside the cable. To obviate this inconvenience M. Baudouin was led to reverse the method of making submarine cables;—to place in the interior the elements of strength and elasticity, and to use the iron wires thus placed as conductors of electricity. Thus, in a Transatlantic cable, M. Baudouin proposes, instead of copper wire, which forms the conductor, to substitute a cord of iron wire, six times and a-half as thick as ordinary copper wires, in order to get an equivalent conducting power.

Again, in a recent No. of the *Scientific American*, we read:—"A correspondent—Wm. H. Danforth—writing to us from Salem, Mass., gives it as his opinion that the construction of the Atlantic telegraph cable is faulty, and that it is liable to failure independent of the best paying-out machinery that may be employed. He asserts that as the inside or conducting copper wires of it are small and laid parallel, while the outside protecting iron wires are twisted and laid on the top of a soft material, that when subjected to great strain, the latter wires will attenuate, and reduce the thickness of the cable, thus causing such a tensile strain to be exerted upon the inside small wires as to rupture them, because they cannot elongate in the same proportion as the twisted outside wires. If such a result should occur, the cable might be laid, and yet fail to operate in conducting messages, because of the inside or conducting wires being ruptured while the outside wires remained intact. Mr. D. asserts that the inside strands should be of sufficient strength to withstand all the strain that may be brought upon the cable. Perhaps it was owing to the drawing out of the inside strands of the cable, during the former attempt to lay it, that the electrical current became *feebler and feebler*, as stated by Professor Morse, while the cable was being run out rapidly in deep water."

Now not a single idea is advanced in all that is here brought forward as novel that has not been repeatedly urged in our pages in connexion with Mr. T. Allan's Submarine Cables. Everyone of our readers who takes the least interest in the subject must remember that the use of light ropes with central inextensible cores of iron wire is the most prominent characteristic of his plans; and that the entire or partial substitution of iron for copper conductors in such ropes is also a notable element of his system. It is only right, therefore, that we should refuse to allow the merit of such arrangements to be now coolly appropriated by either a Frenchman, an American, or any other person.

ELECTROTYPING.

To the Editors of the Mechanics' Magazine.

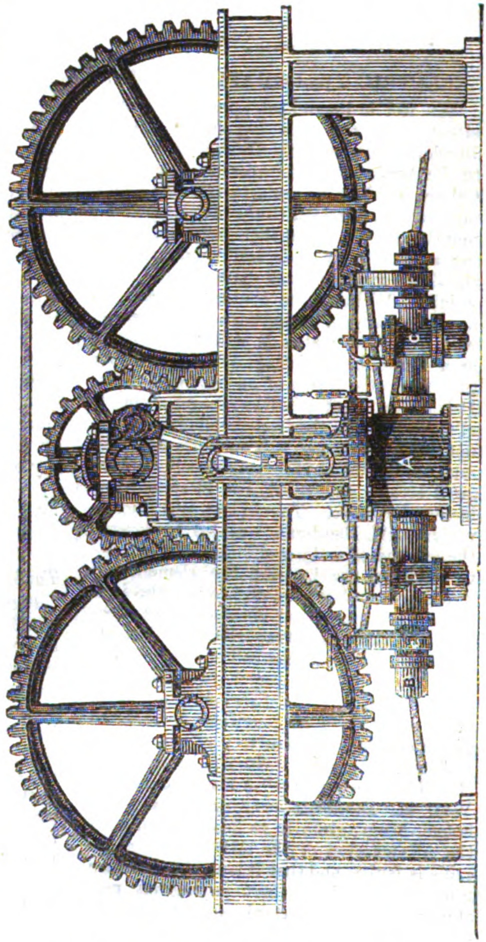
Gentlemen,—I am just reading in the Number for February 6 of your valuable Magazine (col. 1, page 139), a letter of a correspondent designing himself as "Electrotype," who is asking to be helped in some difficulties relating to galvanoplasty. I pray you to be so kind as to convey to that gentleman the information that I am the inventor of an apparatus answering his purpose; and, moreover, that, wishing to make an application in England for obtaining a patent for this amelioration in galvanoplasty, I should be glad to keep correspondence with an English manufacturer who has fully appreciated the extent of the inconveniences I am confident I have completely solved by a simple contrivance. Hoping, gentlemen, you will accept my excuses for the trouble and my thanks for the service,

I remain yours most truly,
A. de Fonvielle.

5, Rue du Cherche Midi, Paris,
March 17, 1858.

BEALE'S APPARATUS FOR PAYING OUT AND DRAWING IN TELEGRAPH CABLES.

Mr. Benj. Beale, of Greenwich, has obtained Provisional Protection for an arrangement of machinery that will act as the retarding apparatus, when paying out the cable, by forcing or drawing air, water, or other fluid, and will also act as the motive power engine for hauling in the cable, when the pressure of steam, air, or other fluid is applied for the purpose.



The accompanying engraving is a front elevation of a machine constructed with two pairs of grooved pulleys, having the cable wound round them, and shows one mode of carrying out the invention. A, is a cylinder, fitted with a metallic piston and a slide valve, the latter moved by an eccentric, in every respect similar to a full pressure non-condensing steam-engine. He prefers using three of these engines in connexion with the same crank shaft, with the cranks set at equal angles with each other, to insure steadiness of action. B, is an inlet pipe, in connexion with a small air vessel at H, and in common with the three cylinders, fitted with a stop valve, C, and vacuum valve, D, having a lever and a Salter's spring balance attached. E, is an outlet pipe, in connexion with a small air vessel at I, and in common with the three cylinders, having a stop valve, F, and escape valve, G, also fitted with a lever and a Salter's spring balance; this outlet pipe is connected with a suitable boiler, which is to supply steam when the apparatus has to be used for hauling in the cable. The motion of the machine is given by the running out of the cable, which turns the wheels with the shafts and cranks, which, through the intervention of the connecting and piston rods, give a reciprocating motion to the pistons, drawing air (the stop valves being closed) into the vacuum valve, D, and forcing it out through the escape valve, G. If the vacuum and escape valves be open, the strain on the cables will be but little more than that due to the friction of the machine.

"If the apparatus be made in the proportions as shown in the engraving," says the inventor, "a pressure of one pound to the circular inch on the pistons, either plus or minus, will exert a tension or strain on the cable of 170 pounds. By the adjustment of these valves and spring balances the pressure on both sides of the pistons may be varied, and a greater or less strain or tension brought upon the cable as circumstances may require: any of the ordinary pressure gauges may be used in conjunction with the spring balances, to indicate the pressure above and below that of the atmosphere, on either side of the pistons.

The total retardation, inclusive of the friction of the machine, could be ascertained by Mr. Bright's Dynamometer, or one of ordinary construction."

Should an accident happen to the cable, or a kink, a fault, or loss of insulation be discovered, the ship must first be stopped and the engines reversed, then steam from the boiler kept in readiness is let through the stop valve, F, on the pipe E, and upon opening the stop valve, C, on the pipe, B, letting the exhaust steam into the atmosphere, the paying out machine is immediately converted into a system of steam-engines for hauling in the cable; a friction brake or a pair of nippers could be used to hold on during examination or repair of the cable.

These improvements are applicable to all paying-out machines, that have one or more revolving shafts.

The advantages set forth by the inventor are, firstly, the extreme readiness with which the machine may be reversed in case of need; secondly, the very smooth and steady action of the retarding force employed, there being no possibility of the parts becoming heated, or abraded, as in the case of the friction brake; thirdly, the valves may be placed in boxes, so that the engineer may adjust them under lock and key, and retire to rest without being at all uneasy as to the due performance of the machine; it may be left in the care of a common-place person, who could not tamper with it, his duty being merely to watch the action of the machine and pressure gauges, as well as the dynamometer, and if he should find that the cable was running out too fast, he would have ample time to apprise the engineer of the fact; fourthly, the valves in the boxes could be loaded up to a maximum pitch, which could not be exceeded without the consent of the engineer; and a lower strain could be kept up by other valves, adjusted (or worked by hand in case of the vessel pitching) to any degree below that of the maximum.

"We will suppose the cable to be running out at the rate of five miles per hour," says Mr. Beale, "and the strain upon it equal to 3,000 pounds, then the power exerted would be 3,000 lbs. × 440 feet per minute ÷ 33,000 = 40 H.P. It does appear preposterous to take up this great power by friction brakes; the heat generated would be enormous, the duration of time being so long, say twenty days, the oil required would be great, and the action of the brake uncertain."

MR. HOLLAND'S DECIMAL SYSTEM.

We this week insert another letter on the decimal system which Mr. Holland has been at so much pains to elaborate. As he has now apparently completed his scheme, and had measures of length made by Mr. Tree, of Charlotte-street, the well-known rule and scale maker, for exhibition at the forthcoming annual exhibition of the Society of Arts, we propose to give a *resumé* of the plan.

The basis of the system is the sixteenth of the present inch, which he at present calls a "Steen." * In our number for Aug. 22d, of last year, Mr. Holland enters largely into the comparative merits of the "Steen," and other bases. It is clear that every measure of length now in use with us can be accurately stated in the new system with a small number of figures. For instance, $\frac{5}{16}$ in. would become 5 st. With an inch base it would become 3·125 tenths of an inch; and with a foot base, it would become $2{\cdot}6041\dot{6}$ hundredths of a foot; the last figure being a repeater. In machinery, bars of iron, &c., the eighth and sixteenth prevail to a very great extent. The tenth of a steen he calls a line, and for micrometrical measurements he uses the prefixes deci, centi, milli; the milliline being 0·00000625 in. 100 steens is a "ped," and 1,000 a fathom. If this fathom be made of the same material as our standard yard, then, at the temperature of about 55° Fah. it will equal 1·587401052 French metres, and therefore its cube will be four times the cube of the metre; a merit of no mean amount in the steen system. The new gallon, being the cube of the ped, will be exactly 4 French litres, and the new bushel 4 decalitres. 10 new fathoms make a new chain of 52 ft. 1 in. long of the old measure. The links, being shorter, will not be so liable to bend as the present ones. 1,000 new fathoms make a new mile of 1,736 yds. 4 ins. old. If we take Professor Airy's determination of the meridian we shall have 69·998861 of these miles to a degree. 70 miles to a degree is much better than 111·11111, 36·45774, or 43·74929, the number of miles by the metre, foot, and inch, bases respectively.

The measures of surface are the squares of the measures of length and their de-

* We shall not here discuss the fitness of the several new designations adopted by Mr. Holland, as they might, if thought desirable, be variously altered. They appear to have been selected with care; nevertheless, their sounds are too novel to be agreeable. They do not, of course, in any way affect the merits of the system.

cuples. Here, again, we have a happy coincidence: 10 square fathoms equal 271·2674 square feet old, the rod of brick-work being 272. If the fathom had been less than $\frac{3}{32}$ in. longer, the new and old rods would have been exactly equal; but we imagine that bricklayers are not in the habit of measuring to $\frac{1}{2}$ in., and the two rods, for all practical purposes, may be considered identical. The new fathom, being only $2\frac{1}{2}$ ins. longer than the 5 feet lath now used by surveyors, could not fail to be acceptable to the building trades. The new rod would also be very near the present land perch, which is 272·25 sq. ft. 100 rods equal the mean of six measures of the German morgen.

The Bulk measures (dry and liquid measures) are derived from the cube of the Ped, that being made the new gallon. The new bushel and firkin of 10 gallons equal 1·10063 old bushels, and 0·97834 old firkin. Prices per old bushel multiplied by 11 would give the new prices to less than a farthing.

In forming the measures of weight, it would be most scientific to make the pound weight equal to the tenth of the gallon of water; but Mr. Holland thinks that many valuable points may be gained by making the new stone of 10 pounds equal to a gallon and a-quarter, and thus making the gallon 8 pounds. The new pound, which he calls a "Libe," will then be exactly half a kilogramme. This half-kilogramme is used throughout the German Customs' Union for levying duties, and is for the future to be used for weighing the coinage. 8,750,000 Union dollars are to be in circulation by the end of 1862, all weighed by the Zoll pound of half a kilogramme. It is obvious how important the "Libe" would thus become. Taking Professor Miller's valuation of the gramme at 15·43,234,874 troy grains, we shall have the new grain =0·772 old; the new millet=7·716 grains; the dram, =1·286 drachms; the ounce, = 1·607536 oz. troy, and 1·7637 oz. avoir.; the libe, = 1·1023 lb. avoir.; the centner, = 110·231 lbs.; and the millier very near to half a-ton. The sovereign in the new weights would equal 159·76114 grains, making the mint price of gold 6·25*l.* per oz. The florin would weigh 226·2072 grains, and at 227·2727 would make 44 florins to the libe. If the proposed copper mil were made exactly a dram, copper would be, of course, a florin a-pound as now, and this would correspond with copper at 1*s.* $9\frac{3}{4}$*d.* per pound. If the 4 mil piece were made the new postage weight for single letters, the corresponding postage would be 5·8 mils. If this 4 dram weight were charged 5 mils, the Post-office would gain on light letters and lose on heavy ones. The half of this for French postage would be 1 decagramme. The French franc would be exactly a new dram. The Russian silver rouble would weigh 3·9978 drams; the Dutch guilder, 21 millets; the American gold dollar would weigh 3·3436 millets—if made $3\frac{1}{3}$, the price would be 3 dollars per dram. The half-dollars silver are issued at the rate of a dollar, equal 497·66 grains new. This could easily be made 5 drams, the weight of a 5 franc piece, which it is now in contemplation to do. This question of the weight of coins is far from being unimportant, and it appears that the new weights would not materially affect the principal coins with which we have to deal.

To the merchant trading with France and Germany, the proposed system must be of great interest, and the scientific man would derive much advantage in being able to easily translate French data into English. We had almost forgotten to say that the French metre is equal to 6·2996 peds, and the are 3·969 rods. Atmospheric pressure of 30 ins. of mercury, and 15 lbs. the square inch, would be represented by 48 new ins. and 53 ozs. the new square inch; the latter number being equal to 14·956 lbs. Cotton falling $\frac{1}{8}$*d.* per pound would equal 5·74 mils per new stone. The 5 mils per stone would come in well. Butchers' meat falling 2*d.* per 8 lbs. stone would equal 1·15 cents per new stone. The cent would come in here admirably. $\frac{1}{8}$*d.* the troy oz. equal 0·837 mils the new oz.

We have taken the trouble thus to set forth the characteristic features of Mr. Holland's system because we believe it to be a very rational and praiseworthy attempt to decimalize the whole of our coinage, weights, and measures upon a single scientific basis.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—In former letters I have shown the many advantages of a decimal system founded on the sixteenth of an inch. There yet remains a very important subject to be considered—viz., the measures of work, and power. To engineers the circular inch is of much more importance than the square inch. The cylinders, rods, pumps, safety valves, &c., are all round and, consequently, their areas or transverse sections are much easier found in round than in square inches. Besides, the areas in

circular inches will be found exactly, whereas in square inches they are only found *nearly.*' I propose that in steam-engine calculations the round inch shall be used, and that, for nominal horse power, the new pressure shall be taken at five new pounds per new inch circular. This will correspond with 17·965 lbs. per square inch present measures. Our present 7 lbs. is much too little, and causes a great difference between nominal and indicated horse power. The measure of a horse power I propose to take at 50,000 new pounds raised one new foot, or ped. per minute. This will be equal to 28706·005 footpounds. The formula for finding nominal horse power will then be

$$\frac{D^2\,5v}{50{,}000} = \frac{D^2\,v}{10{,}000},$$

the simplest formula it is possible to have. Indicated horse power will be

$$\frac{D^2\,pv}{50{,}000}$$

Of course, if we take the new pressure higher than the old, the engines will rank higher in power, and the price per horse will have to be lowered. The old price multiplied by 0·448 will give the new. The old nominal power multiplied by 2·232 will give the new.

And now for a word or two on French horse power. The French take 4500 kilogrammetres per minute as a *cheval de vapeur.* If they were to take 4000, a simpler number, it would correspond with 50,397 new footpounds. A few words on translating French dimensions of engines into English, and finding the horse power may be useful to some of your readers, and save them a great deal of figuring. If the diameter of the cylinder, D, be given in metres, the velocity, V, in metres per minute, and the pressure, p, in centimetres of mercury, then the nominal horse power will be D^2 V, 0·847257. The log. of the last factor is 9·9280151. The indicated horse power will be D^2, V, p, 0·0233183, the log. being 8·3676981. In finding these factors, I have taken the metre at 39·37079 inches, and the specific gravity of mercury at 13,568.

Yours very sincerely,

J. SIMON HOLLAND.

Woolwich.

THE MOON.—The French *Moniteur* announces that photographic experiments were made in France during the eclipse of the sun, on the 15th inst., and established the fact that the moon has an atmosphere of about 25 miles in height.

THE IRON TRADE.

FROM OUR OWN CORRESPONDENT AT WOLVERHAMPTON.

Depression during the Past Month—Smallness of Demand for Iron—Prices—Prosperity Distant—Unemployed Labour—Workmen against the Masters—Preliminary Quarterly Meeting of Iron Masters—Prices Unaltered—Dulness of Scottish Trade—Board of Trade Returns—Diminished Exports—Increased Exports to India.

SUCH a month as that through which we have just passed is happily of rare occurrence in the history of the Iron Trade. Upon the state of things reported last month there is now scarcely any improvement to note. Notwithstanding that there remain now fifty furnaces out of blast in South Staffordshire alone less than there were in the first week in October, yet the make of pig iron is much larger than the demand.

The orders that are coming in are not sufficient to keep the first-class works in full operation.

Prices remain nominally at 8*l.* for bars; but the instances are not a few where good iron is changing hands at lower rates; and for inferior samples prices are accepted that cannot be remunerative, unless the pig iron of which it was made was got for almost an old song.

At the same time the trade is decidedly healthier than it was before the panic. A period of prosperity, however, must be at least six months hence.

There is a distressing amount of unemployed labour in the leading iron-making districts. In South Staffordshire some of the colliers in connexion with the iron works are finding work for the lawyers, and trying to get money themselves by laying informations against their employers for infringements of the Truck Act.

The Preliminary Quarterly Meeting of the iron masters was held on Thursday, the 25th of March, when it was determined that the prices of the past quarter should remain unaltered.

The Scottish iron trade is dull; and a reduction of prices continues. According to the trade circular of a Glasgow house, shipping orders have come in sparingly of late, and prices generally rule lower.

The Board of Trade returns forJanuary show a serious diminution in the exports of iron as compared with the previous year. The following is an extract from the returns:—

	1856. £	1857. £	1858. £
Iron, pig	54,420	57,924	42,353
bar and rod......	367,238	385,243	282,695
,, wire	10,152	17,132	17,082
,, cast	29,756	65,596	58,894
,, wrought	157,785	206,783	166,894
,, steel...............	41,891	59,247	22,892

At this season the exportation of pig iron is confined chiefly to France and the United States, and from both countries the demand was much below that of the same period of last year. To the United States little more than half the quantity of January, 1857, was exported; and there was an increase to France, in respect of quantity, although a decrease in the value. Again, as to bar and rod iron, the United States, as compared with the exports of the corresponding period of last year, took only one-fourteenth, the Hanse Towns one-fortieth, Canada one-fourth, and France and Sardinia one-third; Holland and Australia took larger quantities, but at lower prices; and the only part of the world to which the depression did not extend was India, the exports to which country more than doubled. The exports of wrought iron were, as compared with last year, to Holland three-fourths, to the United States one-fifth, and to Canada one-fourth; but to India and Australia there was an increase.

CONCERNING SEA-SERPENTS.

BY GENERAL T. PERRONET THOMPSON, M.P.

To the Editors of the Mechanics' Magazine.

Gentlemen,—As the affirmations of nautical men on the existence of a marine serpent of great dimensions have lately been renewed (though to some extent neutralized by the declarations of others to similar appearances which proved to be specimens of a gigantic sea-weed), it will not be foreign to the objects of your publication to enter into some examination of the mechanical and other probabilities in favour of the existence of such a creature.

The size of a walking animal is evidently limited, and could not without inconvenience be much greater than in examples found. The radical cause of which is in the fact that weight increases as the *cube* of corresponding dimensions, and the strength of materials only as the *square*. If there were a man 12 feet high, every square inch in the transverse section of his supporters would bear twice as much as a square inch in an ordinary man; and if there were a man 120 feet high, he would *squash* by his own weight, like a figure of the same size made of calf's foot jelly. No traces have been found of a quadruped larger, or at all events not much larger, than an elephant. But when the animal is to be surrounded by water, the reasons for limitation are removed to a scarcely assignable extent.

Models of a whale (*Balæna physalus*, Linn.) and an elephant, were made in clay, without regard to the comparative magnitude of the two creatures. The whale was 3 feet 2 inches long, and weighed 50 lbs. Therefore, as 3 feet 2 inches to 100 feet (supposed the length of the largest whale), so was unity to a number; the cube of which, multiplied into the weight of the model, gave 701 tons for the weight of the natural size in clay. The elephant was 8½ inches high, and weighed 14½ lbs; which (assuming the height of the largest elephant to be 14 ft.) gave in the same manner 50 tons. These numbers of tons present the proportion of the solid contents; or a whale is equal to 14 elephants. This, then, is a measure of the liberty nature has allowed in the difference between quadrupeds and animals afloat.

There is nothing unreasonable in believing that the solid content which exists comfortably in the ocean in one form, might exist in another. When the model of a whale was rolled into a serpent, it presented 2½ times the length, making for the reality 250 feet, with the thinnest part of the neck six feet in diameter, or double the diameter of a water-butt; which gives ample room and verge enough, for any appearance spoken to. And, on comparison, the serpent form can hardly fail to be pronounced the better sea-boat of the two. The support given by the fluid is more divided and more equable. If it were decided to double the dimensions of both, the serpent so risen upon, would be more at his ease than the whale. It may be believed therefore, that if nature chose to go to extremes in respect of absolute magnitude, no form could be better adapted than that of a serpent of the ocean.

It follows that an elephant would roll into a serpent whose length would be to that of the other, as 1 to the cube root of 14; making 104 feet. Which implies less than two-thirds of the solid content of the serpent reported killed with the battering-engines of the army of Regulus on the river *Baradas* in the neighbourhood of Carthage (Tunis), in the first Punic war; of which Pliny (*Nat. Hist.*, L. viii., c. 14.) says the skin and jaws remained in a temple at Rome till the Numantian war (120 years afterwards), and the animal was 120 feet

long. The Numantian war was 200 years before Pliny's time, therefore Pliny is not evidence. There most probably was exaggeration. But the reported size conveys no palpable incongruity like the supposition of a man of similar extension; and the report may be received as testimony to the existence of a terrestrial animal of extraordinary magnitude in the serpent form.

That there are serpents in the sea, living in that element at great distances from land, and fitted for it by peculiarities in their construction, is as certain as that there are land-snails and water-snails, land-mammalia and water-mammalia. The writer may be able to add to the information of naturalists on the point. In the year 1815, approaching the coast of India on a voyage to Bombay, he took up an "Arrian" which is now on his table, and in the map attached to the *Periplus* or Circumnavigation of the *Erythræan Sea* or Indian Ocean, his eye was caught by the representation of serpents swimming in the sea at a hundred leagues from land. This led to an examination of the text for serpents; and they were found in four places, as among the tokens by which navigators were to judge of their nearing the land, a matter of increased importance in Arrian's time, when the power of determining the ship's place was so defective. They are described as what the Latin translation calls, "*prægrandes et nigri*" (very large, and black) in the Bay of *Barace* (Gulf of Cutch); but in the neighbourhood of *Barygaza* (Baroach) they are "smaller, and of green and golden colour." Another *Barace* is mentioned in the neighbourhood of Cochin, and there the serpents are "black like the others, but shorter, *dragon-looking* in the head, and with blood-coloured eyes." Also serpents, but without particular description, meet the navigator off the mouths of the *Sinthus* or Indus. The work of Arrian is exactly such a memorial as is kept at the present day by traders on the coast of Africa, setting down where good pepper was to be had, and where the chief and his people were well-disposed or the contrary. Arrian lived under the Emperor Adrian, about A.D. 130.

With these knowledges the writer went on deck, and did not look many minutes without seeing the serpents, not one, but three or four, and felt no doubt that the number might have been increased to any extent. The largest he judged to be four feet long; the length of a serpent is deceptive on the side of being estimated at too little, in consequence of the bends, but he speaks from familiarity with the creature. They floated on the water with the head out, and the body formed into bends in the same plane, like a succession of letters S. Their colour, though the situation was not very favourable for judging, appeared much like the olive-brown of the English harmless snake (*Coluber natrix*). Your snake has everywhere strong propensities for the water, founded on possessing the respiratory system required for remaining a long time beneath. The weather in the case described was not a calm, but a moderate breeze, which caused no more waves than the creatures appeared to ride over with perfect satisfaction. None of them gave any specimen of its locomotive powers. The distance from land cannot be stated with precision; but the land had not been sighted, and the probability is it was not less than thirty or forty miles. How does such a creature live? What does it eat, and how does it take its prey? Does it chase the finny tribes; or does it live on sea-insects or *crustaceæ*, at the surface or at the bottom?

But it was once his chance to come into closer contact with a serpent-marine. In the Persian Gulf, near *Râs ul Khyma*, the bow-man of a man-of-war's boat caught one up with his boat-hook, and jerked it into the stern-sheets among the sitters. It was about two feet long, and in colour not much different from what has been named, but with more of marked spots than in the *natrix;* in which it agrees with the viper kind. It had no organisation of the nature of gills, but a very remarkable provision for swimming. The tail was blunt, and for four or five inches towards the end presented a fourfold longitudinal corrugation, manifestly intended to act like an oar in what boatmen call *sculling*, as performed with a single oar put out directly astern; which is the process by which all fishes give themselves their greatest velocity. The writer never saw a salmon-leap, and has heard it described as performed by the fish bringing the tail and head together, and then suddenly straightening itself. But he remembers seeing a fish of the size of a middling salmon, shoot out of the water in the harbour of Maskat, to the height of the Imâm's frigate's foreyard; and it was curious to see how, when it arrived at that height, it lost all power of guidance, and turned over helplessly like a man tossed in a blanket. But it was clear that it shot out of the water by the *sculling* action of the tail, just as if it had been making a rush after its prey. The fourfold corrugation in the serpent must be intended to give something of the same power. If four coins of like kind are laid on the table so as to inclose an equilateral space, the figure

inclosed will give an idea of the transverse section of the tail.

It is to be regretted that examination was not made, whether it had the four rows of teeth in the upper surface of the mouth, which are held to be the only unequivocal evidence of a poisonous snake. The general belief is that the sea-snake is not poisonous; but there were stories of a fisherman at Madras having been bitten and died. An indistinct recollection is felt of having seen, many years ago, an account of the sea-snakes at Madras or some other part of India, in the articles appended to the "Annual Register." If the sea-snake is poisonous, it may aid him in getting his living by destroying creatures he could not otherwise master; which must be supposed to be the intention of giving such faculty to any of his relatives on shore.

It is probable that the aptitude for taking to the water is common to all the terrestrial kinds. A respectable Afro-Englishman at Sierra Leone told the writer, in a conversation upon serpents, that he was at anchor in an African river, name forgotten, when a serpent rushed through the underwood with a frightful noise, and shot under the bottom of his vessel, making a white track in the water, and went into the woods on the other side. It was as thick, he said, as a mast of his vessel (a schooner probably of 30 tons), which is in no way inconsistent with the known dimensions of the serpent tribe.

Men of science have not been backward in declaring the reasons they conceive opposed to the existence of a sea-serpent as reported. After the heavy falls which have been received in undertaking to pronounce upon the negative, philosophers should be on their guard. When they have been found laying down the impossibility of going twenty miles an hour on a railway, and of a steam-vessel reaching America, it is not incredible that a moon's atmosphere and a sea-serpent may at some time add to the list of their fallibilities.

The objections advanced appear reducible to the alleged absence of remains, in either a recent or a fossil state. Without entering into dispute upon the premises, the inference may be tested arithmetically. During several centuries the giraffe was suspected of being an imaginary creature; the only testimony to its existence consisting in an assertion that it had been seen in the amphitheatre at Rome, and a representation of it on Trajan's column. Assuming the existence of sea-serpents to the greatest extent the most ardent supporter could desire, there will be little opposition to the probability that there are and always have been a hundred times as many giraffes in the world as sea-serpents. Setting aside the individuals destroyed by the agency of man, how many remains of giraffes have introduced themselves to the notice of the learned in Europe, either in a recent or a fossil state? Have there been any; or, at the utmost, have there been ten? But if there were ten, and the number of sea-serpents was the hundredth part, then the chance of discovery of a sea-serpent in the ways proposed, would be reduced to what an actuary would describe by $\frac{1}{10}$, or 9 to 1 against it.

One thing, however, is clear,—that the water-borne men, the next time they meet the sea-serpent, must be particular in trying to take cognizance of his being flesh and blood, and not come away with the risk of reporting a trail of sea-weed.

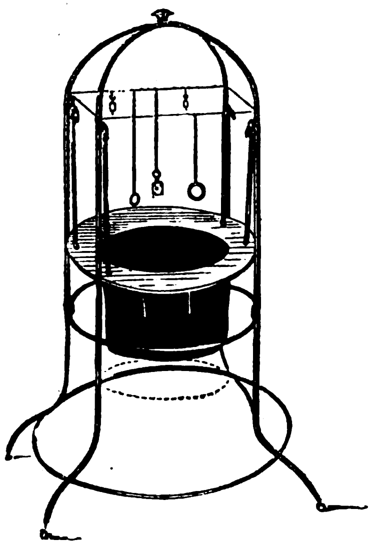
I am, Gentlemen, yours sincerely,

T. PERRONET THOMPSON.

Eliot Vale, Blackheath, March 24, 1858.

CLIFTON'S PATENT SEAT FOR CHILDREN.

A VERY few weeks since we drew attention to a patent nursing chair for children possessing many advantages; and we have now to make reference to a similar but



improved contrivance, designed to afford security, exercise, and amusement to the dear little people. The new seat is the invention of Mr. Clifton, of Oxford-street, Lon-

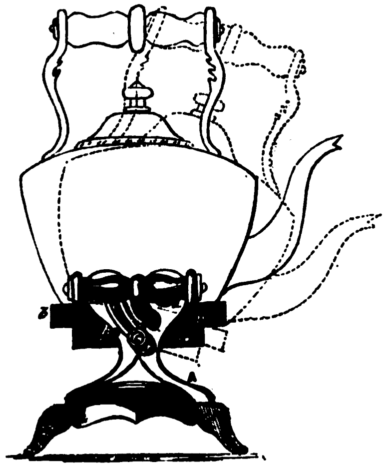
don, who has protected it by Letters Patent. It is represented in the accompanying engraving, and consists, as will be seen, of a light frame running on rollers, within which frame a chair is suspended by india-rubber springs. The chair consists of an annular board, carrying beneath it a cloth or other flexible seat having apertures in it through which the legs of the child are passed. Whistles, rings, and other toys are suspended by elastic cords from transverse bars or lines across the upper part of the frame. The child, when seated, by its own spontaneous movements imparts a dancing motion to the suspended seat, and this, with the baubles around it, affords it exercise and amusement, while the form of the frame is such that the child cannot throw t over.

CUNNINGHAM'S PATENT SELF-REEFING SAILS.

A most interesting lecture was given by Henry D. P. Cunningham, Esq., Royal Navy, at the United Service Institution, Whitehall, on Monday night, on "the History of Sails, Sail Power, and on Cunningham's Self-reefing Topsails." The lecturer sketched the history of sails from their earliest mention in Ezekiel, with reference to the ships of Tyrus, and through their progressive improvements to the present date. He then set forth the advantages which navigation has derived from his improvements in handling sails, or, to use his own expression, bringing the sail power more under mechanical control,—a most striking instance of which he mentioned in the case of the ship *Hurricane*, of 1,608 tons register, having been navigated from Hong-Kong to San Francisco, with a crew of only twenty-five Lascar seamen and three European steersmen,—a feat that could not have been attempted by the commander if rigged on the old method. He gave also some startling information respecting the loss of human life caused by the old method of reefing topsails, quoting an extract from the New York *Daily News*, in which it is stated that no less than 1,000 lives are annually lost in the mercantile marine in the United States by falling off the yards: —all of which Mr. Cunningham's invention is calculated to prevent. A most animated discussion arose after the lecture, in which Captains Nollath, Fishbourne, Rider, &c., Royal Navy, took part respecting the applicability of the invention to the Royal Navy; and the fine models with which Mr. Cunningham illustrated his lecture were eagerly examined by the company, consisting principally of superior officers of the Royal Navy, among whom was Admiral Sir George Sartorius. The general opinion was one of admiration at the simplicity and perfection of the invention. After a vote of thanks to the lecturer, which was warmly supported, the Meeting broke up.—*Hampshire Telegraph.*

MIDWINTER AND CO.'S IMPROVED SWING KETTLE-STAND.

Swing Kettles have been heretofore made, but Messrs. Midwinter and Co. have registered an invention by means of which a portion of the stand itself is made to swing, whereby the unsightly and inconvenient projecting studs upon the sides of the kettle are dispensed with. In the annexed sketch, A is the frame or stand;



B, a pan or tray (to receive the kettle, K), supported on each side by two studs or axes, *c*, *d*. The stud, *d*, turns in a fixed bearing, but the stud, *c*, moves in the arc, *e*, *f*. G is a well for a heater. At the back of the tray, B, there is a slot, *b*, to receive a stud in the back of the kettle, which locks it in its place. A pin, *h*, is inserted when the kettle is not to swing, but when it is desired to tilt the kettle for pouring (as shown by the dotted lines), the pin is withdrawn, when the stud, *c*, is free to traverse the arc, *e*, *f*.

ARTIFICIAL WHITE LIGHT.

THE light produced by wax and tallow candles, and by oil and gas under combustion, is yellow in colour; this is the reason why we can scarcely distinguish between blue and green colours at night by artificial illumination. A correspondent of the London *Mechanics' Magazine* makes an inquiry regarding the possibility of obtaining artificial white light, by making it pass through a series of glasses tinted according to the prismatic spectrum, neglecting the yellow ray, of course. A very great improvement in the colour of the artificial light could easily be effected by employing globes or shades of a very faint purple colour. Purple is composed of the red and blue rays of the spectrum, which, properly combined with the yellow ray, produce white.—*Scientific American.*

A PORTUGUESE CORVETTE ON FIRE IN DOCK.

AN accident by fire, which threatened to become serious, occurred last week on board the Portuguese steam corvette "Bartolomeo Dias," then lying in the East India Docks. It appears that one of the stokers lit a fire in the boiler furnace, and the boiler being empty, the plates of it became red hot, and set the lining on fire, which again communicated it to the ceiling of the ship. Upon the alarm being given, recourse was immediately had to a 5½-in. double-twin pump (Roberts' patent), in which the officers of the ship had great confidence, and the fire was speedily checked and subdued. The captain of the ship states his belief that, but for the readiness with which the new pump was got to work, the fire would have been attended by very serious consequences, and that he knows of no other pump equalling it in efficiency. The vessel saved was a fine new ship, just completed at Messrs. Green's dockyard, and fitted up as a yacht for the use of his Majesty the King of Portugal.

ON THE MOON'S ATMOSPHERE.

To the Editors of the Mechanics' Magazine.

GENTLEMEN, — If your correspondent, General Thompson, does not think that the bottom of Mount Blanc is more dense than the top of it, he may substitute "the sea" or "a mound of loose earth" for the words "Mount Blanc" in my last letter. The elasticity of the air has nothing whatever to do with the question, which is,—whether "arithmetical calculation" would not prove that the density of a body becoming less and less denser, as we get higher, never becomes nothing?

Your correspondent must surely forget that air is a fluid; and that the word "*pressure*" cannot, with accuracy, be used in reference to it; inasmuch as it is unconfined, except by the attraction of gravitation to which it is subjected.

Your correspondent appears to think, that I am wrong in objecting to a theory in reference "to distances to which we have no access,"—whilst he advances a theory, in reference to such matters, totally opposed to the results of all previous investigation; and undertakes to prove the *necessity* of his theory being correct, by *assuming* the facts necessary to prove it!

We ought not to get into what the lawyers term "a false issue." My assertion was, and is, that your correspondent *assumes* the existence of a certain state of things necessary to prove what he undertook to prove must, of necessity, exist.

Your obedient servant,

J. T.

A REPEATING MILITARY ARM.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—In the Museum of the United Service Institution there is a Chinese cross-bow, having a magazine for bolts affixed to it. The action of placing the bolt in its position is by using the lever like the act of pumping, so that the bolts can be discharged with great rapidity. The bow of this instrument is made of bamboo, consequently it has not much power; but if it were made of steel I think such a weapon would be well adapted for the defence of a military post.

I am, yours, &c.,

J. NORTON.

Rosherville, 22d March.

INSTITUTION OF ENGINEERS IN SCOTLAND.

THE Institution of Engineers in Scotland will meet in the Philosophical Society's Hall, George-street, on Wednesday, the 31st March, at eight o'clock evening. A discussion will take place on Mr. Morton's paper read at last Meeting, "On employing steam expansively." The following papers will be read:—"On the expansion of steam in steam-engines," by Mr. J. G. Lawrie; "Notes on American locomotive engines and rolling stock," by Mr. W. Neilson; "On the stability of locomotives," by Mr. J. G. Lawrie; "Notes respecting the in-

vention of the screw-propeller," by Mr. Nichol, communicated by Mr. D. Mackain. The last Meeting of the session will be held on the 14th April, when the election of office-bearers for next session will take place.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

WRIGHT, W. *Improvements in flushing apparatuses, applicable to cisterns and water closets.* Dated June 20, 1857. (No. 1722.)

This invention was described and illustrated at page 297, No. 1781, Vol. 67, of the *Mechanics' Magazine.*

GARDNER, E. V. *Improvements in the means employed for burning fuel, and in the distribution of heat.* Dated June 20, 1857. (No. 1723.)

This cannot be described without engravings.

FOX, S. *Improvements in fly pressers.* Dated June 20, 1857. (No. 1724.)

This consists in a particular method of arranging the stops which regulate the distance within which the upper dies approach the bed dies.

FOX, S. *Improvements in the manufacture of umbrellas and parasols.* Dated June 20, 1857. (No. 1726.)

This consists—1st. In a method of forming the bit or piece fixed on the rib for attaching the stretcher. Before the rough bit is put into the forming dies, it is struck on its end by an additional pair of dies, which brings it to such a form that it lies well within the engraved portion of the forming dies, and when these come together they expand it to the exact form without producing a burr. It also relates to catches of umbrellas and parasols. When spring-wire catches are employed, in place of cutting a slit in the tube, it is only indented to form a groove into which the catch may sink.

DUNINGTON, H. *An improvement in the manufacture of cotton and silk and other warp pile fabrics.* Dated June 20, 1857. (No. 1727.)

This consists in submitting self-acting warp pile fabrics made by introducing soft yarn to be afterwards raised into a pile, to a process of shearing or cropping after they have had a pile raised thereon, without subjecting such fabrics to fitting or fulling processes.

RICHARDSON, B. *Improvements in manufacturing and ornamenting articles of flint glass.* Dated June 20, 1857. (No. 1728.)

Here the bottles, &c., are blown as usual, whether of one colour or of glass of two or more colours; and in order to ornament such articles, parts of the surfaces thereof are to be coated with a solution of gutta-percha, &c., and from such coated surfaces parts of the coating are to be removed so as to produce thereon an ornamental device. The articles are then dipped into fluoric acid, combined with sulphuric acid, and the effect will be, that parts of the surfaces of the glass will be dissolving away, and yet both the ornamental design and the other part of the glass will be left clear and bright.

BUNN, L. St. L. *Improvements in the manufacture of Wellington boots.* Dated June 20, 1857. (No. 1731.)

Here the legs of Wellington boots are made of waterproof woven fabric, either by means of india-rubber combined with sulphur, or of waterproof woven fabric coated and impregnated with drying oils and pigments.

CALDICOTT, T. F. *Improvements in planes.* (A communication.) Dated June 20, 1857. (No. 1733.)

This consists in fixing handles to the bodies of planes, so that the same handle may, at different times, be used with the bodies of several and different forms of planes.

COWELL, L. *An improved machine for teaching the art of swimming.* Dated June 20, 1857. (No. 1734.)

This consists in apparatus for giving peculiar simultaneous movements of the limbs of persons, in teaching them to perform the correct actions necessary in swimming, whether used in or out of the water for communicating instruction.

NEWTON, W. E. *Certain improvements in looms for circular weaving, partly applicable to other purposes.* (A communication.) Dated June 20, 1857. (No. 1735.)

This consists in a mode of effecting the crossing of the warp threads in circular looms, so as to form a shed into which the weft thread is carried with a circular motion. It is applicable to the weaving of a hollow web upon a cord, wire, tube, &c., as in the manufacture of blind cord. It also consists in constructing self-adjusting damping guides to prevent the fabric from turning and to maintain it in a firm condition at the weaving point. Also in the application of a spring drag to the bobbins by which the very warp and weft threads are supplied, for the purpose of producing an uniform tension on the threads.

LYNDE, J. G. *Improved means for detecting and preventing the waste of water*

in cisterns. Dated June 20, 1857. (No. 1736.)

Here the patentee mounts loosely on the stem of the cock of the water supply pipe a second ball or float, which dips into a supplementary cistern arranged to receive water from the main cistern just before it reaches (owing to the unchecked supply) the level of the waste water pipe. As the water rises in this supplementary cistern it will lift the float which, by a suitable connexion with the cock or valve stem, will turn the cock and cut off the supply, if the ordinary ball cock fails to act.

FLETCHER, C. *Improved machinery for making bricks, tiles, and other articles of clay or plastic materials.* Dated June 20, 1857. (No. 1737.)

This consists in adapting to the feeding part of the machinery rollers, provided with sliding pallets, which are made to move radially from and to the centre or axis of the rollers as the latter rotate in their bearings. The rollers or cylinders are provided with flanges, whereby the clay or plastic material is prevented from being squeezed out laterally.

LA BAW, G. W. *Operating the sails of vessels from the deck by means of vertical shafts.* Dated June 20, 1857. (No. 1738.)

This consists in a series of vertical shafts, so connected with the sails of a vessel as to furl them by their rotation, in combination with a continuous shaft extending to a convenient position for operating, when the continuous shaft is so arranged in connexion with the shafts to which the sails are attached, that one or more of the several sails upon the same must be furled at the same time, and by the same rotation of the power shaft.

NEWTON, W. E. *Improved machinery for cutting files.* (A communication.) Dated June 22, 1857. (No. 1740.)

This consists in a mode of operating the cutting chisel in file-cutting machines, for the purpose of producing an uniform depth of cut from end to end of a file. The patentee claims—fitting the chisel to work in a stock which rests upon the file blank itself, or on a pattern of similar form moving with it throughout the whole length of the movement of the blank under or past the chisel, and serving as a stop to the chisel.

NORRIS, J., jun., and G. WORSTENHOLM. *Improvements in machinery for making nails, bolts, spikes, screws, rivets, and screw blanks.* Dated June 22, 1857. (No. 1741.)

The machinery is composed of shaping dies, a heading tool and feeder, all working by direct action from the axis of motion or driving shaft. Each set of these tools may be employed singly in one machine, or in duplicate.

KNOWLES, Sir F. C. *The manufacture of aluminium, and of certain re-agents to be used therein.* Dated June 22, 1857. (No. 1742.)

This invention is described at page 278, Number 1806.

KNAPTON, W. *An improved machine for drilling holes in metal and other substances.* Dated June 22, 1857. (No. 1746.)

This relates to a mode of holding round, square, or other shaped articles, both solid and hollow, whilst drilling holes in the same, and is particularly adapted to water pipes, gas pipes, and such-like fixed articles.

SYMONS, W. *Improved means of communication between the passengers and guards of railway trains.* Dated June 23, 1857. (No. 1748.)

Here a bell is fixed in the guard's box, and hung on a spring as low down in the carriage as practicable, and when at rest is supported in a socket in a board. The board or support is so arranged that when a weight falls upon it, or upon a lever connected with it, the board falls, and the bell, being set free, rings. The weight is supported by a cord passing along the train of carriages within reach of the passengers.

SHAW, R., and J. ROBINSON. *Certain improvements in machinery for preparing cotton and other fibrous materials.* Dated June 23, 1857. (No. 1749.)

This invention cannot be described without engravings.

EVANS, D. *Improvements in locomotive and other furnaces, and in heating water to be supplied to steam-boilers.* Dated June 23, 1857. (No. 1752.)

Here, in place of using the ordinary grating of fire-bars to support the fuel, a hollow box or platform for containing water is used. Through this box tubes are fixed to admit air to support the combustion of the fuel. Water is supplied to the box at the lower part by a pipe connected with the tender or with another cistern containing water. Another pipe takes off the heated water, and returns it to the tender or cistern from which the boiler is supplied.

ROUSSELOT, J. S. *An improved method of obtaining motive power, and engine for applying the same.* Dated June 23, 1857. (No. 1754.)

This consists in the employment of an electric current as a primary agent, and atmospheric air as the medium for transmitting, by its expansion, motion to pistons, and thence through rods, cranks, &c., to

any apparatus. It also consists in the construction of an engine for carrying this method of obtaining motive power into operation.

BROOMAN, R. A. *An improved method of engraving and of copying figures, patterns, and other devices.* (A communication.) Dated June 23, 1857. (No. 1755.)

This invention was described and illustrated at p. 2 of No. 1795, Vol. 68.

MORCOM, R. *Improvements in dressing ores.* Dated June 24, 1857. (No. 1759.)

This consists, 1st, in imparting movement to the stampers usually employed in the process of dressing ores. In order to maintain invariable the efficiency of the stamper, the patentee proposes during the process of raising the stamper to communicate to it a rotary movement. 2d, in applying to the ordinary buddle certain discharging valves.

MALLET, R. *Improvements in tiles and coverings for roofs and other parts of buildings.* Dated June 24, 1857. (No. 1761.)

The patentee constructs roofing tiles of metal or glass, or of pottery, of a square or lozenge form, adapted for being placed diagonally on the roof, and susceptible of various ornamental and other combinations.

GENHART, H. *Improvements in fire-arms, in rifling the same, and projectiles employed therewith.* Dated June 24, 1857. (No. 1763.)

This invention cannot be clearly described without engravings.

IRELAND, G. *Improvements in raising weights, applicable to stamping or cutting metals or other similar purposes.* Dated June 24, 1857. (No. 1764.)

Here a drum or pulley is fixed upon a shaft driven continuously, around which drum, &c., the patentee places a loose hoop or ring, which, being of larger diameter than the drum, &c., allows the same to revolve freely within it. A rope is passed over this loose hoop or ring, having attached to one end of it the weight to be raised, the other end hanging free. When in operation the free end of the rope is tightened, and drawn downward, producing friction between the loose ring or hoop and the drum, &c., and thus raising the weight, which being attained the end of the rope is released, and the weight falls.

JUCKES, J. *Improvements in washing machinery.* Dated June 24, 1857. (No. 1765.)

Here a tray is used of a circular form, and fixed on a vertical axis so as to admit of the tray having a rotating motion. The bottom of the tray is perforated so that water may rise up near the axis of motion, and be thrown outwards by centrifugal action. The raised edge of the tray is also perforated, so that the water may pass off during its rotation. The water used is contained in a vessel in which the tray rotates. Pressing rollers on horizontal axes, which can rise and fall freely, are arranged to press on the fabrics as the tray is rotated under the rollers, and by the tray so rotating it causes the rollers to move round on their own axes. The rollers and their axes are arranged so as to be raised off the tray, to admit of it being revolved more quickly after the water has been drained off, by which means the fabrics will be thrown outwards and pressed against the perforated periphery, and thereby deprived of their moisture.

SANDERSON, C. *Improvements in the manufacture of railway bars, girders, and other articles requiring great strength and stiffness to resist pressure, concussion, or strain.* Dated June 24, 1857. (No. 1768.)

This relates to making the above articles of a combination of iron and steel or of steel only, and afterwards hardening and tempering them.

EXLEY, J., and J. OGDEN. *Improvements in furnaces or fire-places for the prevention of smoke.* Dated June 24, 1857. (No. 1770.)

Instead of a flat or plain dead plate placed on a level with the grate bars, the patentees bevel the back of the dead plate, and place the grate-bars on a level with the lower part of it. The bevelled part of the dead plate is perforated to admit air to the fuel, and the upper or flat part is provided with an air-valve which opens inwards. This air-valve is capable of being opened and closed by rack and pinion, which will admit of the supply of air being regulated.

JOHNSON, J. H. *Improvements in apparatus for testing the strength of materials.* (A communication.) Dated June 24, 1857. (No. 1772.)

This consists in employing gearing and mechanism for applying strains or forces, in combination with a piston operating against a body of water or other fluid contained within a cylinder, so that on applying the strain to the object to be tested such pressure shall be transmitted to the fluid in the cylinder, and thence to an indicating apparatus in connexion with the same.

PONTONERIE, E. B. De la. *Improvements in apparatus for consuming smoke.* Dated June 24, 1857. (No. 1775.)

Here the pipe which conducts the steam from the boiler to the fire bridge, for mixing with the products of combustion in passing along the back or sides of the furnace, is

enclosed in fire clay, or porcelain, for the purpose of more effectually absorbing and giving off to the steam in such pipe the heat of the fire, as well as of protecting the pipe from injury when not filled with steam, and the patentee arranges the jets so that the steam may act upon the flame produced just above the fuel, and in a direction to meet the flame in its passage to the flue.

PAGE, C. G. *Improvements in cylindrical door-bolts.* Dated June 25, 1857. (No. 1776.)

This cannot be described without engravings.

PITMAN, J. T. *Improvements in machinery for making wood screws.* (A communication.) Dated June 25, 1857. (No. 1777.)

This cannot be described without engravings.

GREEN, W. *The letter announcer.* Dated June 25, 1857. (No. 1779.)

This consists in constructing a letter-box plate and flap with a gong, bell, or other striking apparatus.

WRIGHT, J., A. WRIGHT, and F. ROBERTS. *Treating the rhubarb plant to render its fibres applicable to the manufacture of paper, and the juice thereof to the manufacture of wine and spirits.* Dated June 25, 1857. (No. 1781.)

Here the stalk of the rhubarb plant is passed between rollers to express the juice. The fibre then is well washed, to get therefrom as much of the acid property as possible. The fibre should then be bleached by chloride of lime, &c. To prepare the paper pulp from the fibrous part of the stalk the fibre is placed in a vessel, boiled, and then beaten or torn to pulp by any of the usual methods of reducing rag to pulp. For the manufacture of wine, the juice is taken and boiled, and poured upon lump sugar, yeast is added sufficient to make it ferment; which will take three or four days. It should be then strained and placed into a cask, and the bung not fastened down till it has finished working. The wine should remain for four months, and then be sweetened with fine lump sugar. For spirits, the juice should be treated in the same manner as in the first stage of making wine; after the fermentation is ceased it should be placed in a still.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

RENNIE, R. *Improvements in self-acting trap-doors for mines.* Dated June 19, 1857. (No. 1720.)

This relates to so arranging trap-doors used in mines for ventilating purposes, that the passage through of the wagons shall open and close the doors without any manual or secondary interference.

GRAHAME, T. *Improvements in facilitating the passage of carriages on inclines of railways.* Dated June 20, 1857. (No. 1725.)

For this purpose, on the upper level of each incline of a railway, and not far from the top of the incline, is arranged apparatus for fixing a locomotive engine to the line of way, together with a windlass for winding on and off a wire rope. The engines of the locomotives are also arranged to be put into gear with such windlass, in order to give motion thereto, and to wind the wire rope on or off the windlass, according as a train is about to be raised up or run down an incline.

CLARK, E., and J. H. TUCK. *Improvements in blocking or supporting ships and other vessels for the purpose of docking them.* Dated June 20, 1857. (No. 1729.)

Here blocks are employed which are drawn by tackle towards the keel of the vessel to be blocked until they bear against the side of the vessel, and the blocks are prevented from receding after having been drawn up by racks, &c., on the floor of the dock, into which racks pawls carried by the blocks fall. The blocks are employed in sets of two or more, one working on the top of the other, and when the first block has been drawn against the ship and becomes fixed by its pawl, then the block above is similarly drawn forward on the lever block till it comes against the side of the vessel, where it becomes fixed by its pawl falling into the teeth of a rack on the lower block.

WHITE, J. *Improvements in escapements for chronometers and other time-keepers.* Dated June 20, 1857. (No. 1730.)

Here, in place of making the end of the detent of the escapement into a fine spring, as heretofore, such detent is caused to be fixed on an axis immediate of its length, and such axis has a fine coil spring at the lower extremity which constantly tends to press the end (which is acted on by the cam on the axis of the impulse roller) towards the escape wheel. And in order to adjust the escapement, the bearings of the detent axis are arranged to slide and to be fixed according to requirement.

LOMAX, W. R. *Improvements in governors and pressure-gauges.* Dated June 20, 1857. (No. 1732.)

In constructing a governor for regulating the supply and pressure of steam actuating the piston of a steam-engine, a rotary blower or fan-wheel is used, by which the air, &c.,

received into its case is forced into a chamber having a moveable partition against which the pressure of air acts. The pressure-gauge consists of a weighted lever, a plunger acting upon it, and an indicating dial.

FONTAINEMOREAU, P. A. L. DE. *An improved propeller.* Dated June 22, 1857. (No. 1739.)

This is composed of two or more wheels placed obliquely at the sides or stern of the vessel, and connected together by rods having the paddles attached to them, so that when the wheels are put in motion the paddles enter the water in an oblique direction, and thus give motion to the vessel.

MURDOCH, R. *Improved running gear for vehicles.* Dated June 22, 1857. (No. 1743.)

Here the fore wheels are attached to short or half axles, and the inventor projects forward and outward from the front side of each of the short axles a lever or bar, which is firmly attached to the angles. The forward ends of these two levers are united by a cross bar, which is pivoted to them, and at the middle of its length is also pivoted to the pole or tongue of the vehicle. The effect of this arrangement is, that when the vehicle is turned the axles all converge to the common centre of the circles described by the paths of the wheels.

SEROPYAN, C. D. *A mode of preparing bank notes, bills of exchange, and other papers, to prevent counterfeiting by photography and its kindred processes.* Dated June 22, 1857. (No. 1744.)

The documents relating to this invention are with the law officers under objection.

MACKENZIE, T. *Improvements in the internal decorations of those parts of buildings to which window draperies are to be affixed, and in the arrangement and construction of the curtain fixtures.* Dated June 22, 1857. (No. 1745.)

This is designed, 1st, with a view of dispensing with the necessity for using cornices as heretofore practised, by so constructing the architrave of the window as to make it serve the purpose of a cornice; and, 2d, for strengthening the pole or rod on which the curtain rings slide, and making it occupy less space than round curtain poles.

BRIDGMAN, T. C. *Improvements in the construction of screens, riddles, or sieves.* Dated June 23, 1857. (No. 1747.)

Here two frames are arranged one within the other, and fitted so that they can be raised or lowered as required, either parallel or otherwise. Each frame contains transverse bars at certain intervals to support the wires or rods, and the bars of one frame adjoin the bars of the other frame, so that on raising them or lowering them the spaces between the wires are thereby enlarged. Each frame contains half the number of wires or rods alternating with each other to form the entire screen.

PROUDFOOT, D. *Improvements in drying and preparing garancine.* Dated June 23, 1857. (No. 1750.)

The garancine to be dried is placed in a horizontal metal cylinder and heated by a fire or by steam. This cylinder is at a slight vertical angle, and the garancine being deposited in the elevated end, is made to revolve, and the dried garancine is discharged at the lower end of the cylinder. An artificial current is created in the cylinder, so that the vapour rising is thus carried off.

HINKS, J., and J. S. NIBBS. *Improvements in securing and liberating the corks or stoppers of bottles, and in the construction of the necks of bottles, for facilitating the securing and liberating of corks and stoppers.* Dated June 23, 1857. (No. 1751.)

1st, the inventors fix a ring of metal upon the neck of the bottle. On opposite points of the ring are loops through which a wire is passed, and which wire being passed over the cork, and twisted, secures the cork in the bottle. 2d, Upon bottle-necks are made, at opposite points, loops of the material of which the bottle is made. The loops serve for the holding of the wire with which the cork is secured, as first described.

BROOMAN, R. A. *Improvements in breech-loading fire-arms.* (A communication.) Dated June 23, 1857. (No. 1753.)

Here a box in wrought iron contains all the mechanism. This box has straight side-plates, which carry a pin or bolt, on which is mounted a lever, divided into branches or forks at its fore end. These branches embrace the breech-piece on the right and left, to impart to it backward and forward motions. In the rear of the moveable breech-piece is a large wedge or abutment-piece, sustained by a small wedge. This piece receives in a receding angle the back of the breech-piece, which is of a corresponding angular form.

NEWTON, W. E. *Improvements in generating or obtaining motive power.* (A communication.) Dated June 23, 1857. (No. 1756.)

This consists, 1st, in generating steam or elastic vapour from water held in suspension in an elastic "vehicle," as steam or other vapour, or air or other gaseous fluid, through the agency of heat conveyed to it by a medium without the exposure of its vapourising vessel to the direct action of fire, and without admixture of the water,

&c., and the vehicle in which it is held in suspension with the heating medium during such process; 2d, in the employment, as the vehicle for holding water, &c., of a gas perfectly aeriform at ordinary atmospheric temperatures; 3d, in the engine to be operated there are employed cylinders provided with absorbing wicks, for the purposes of drawing up the fluid into the injecting pump; 4th, in the construction of the engine. Each stuffing-box is provided with a space between two gaskets, and which space is connected with the "cold receiver" for the purpose of carrying away and absorbing any ammonia gas that may pass through the stuffing-box into the space.

WOOLLEY, E. *An indicator for registering the names of persons occupying chambers and other apartments or offices, and for signifying whether such persons are in or out and at what time they will return.* Dated June 23, 1857. (No. 1757.)

The inventor constructs a frame or case, and in the front thereof makes several openings, both lengthwise and crosswise, and behind each opening arranges upon a roller pieces of paper, on some of which are printed the names of the residents and on others the words "in," "out," and on others numerals of hours and half hours. Each end of the case is formed with compartments (accessible by doors) containing the mechanism for adjusting the rollers.

FULTON, H. H., and T. B. ETTY. *Increasing the traction and bearing surface of carriage wheels.* Dated June 24, 1857. (No. 1758.)

This consists in applying to the wheels of carriages an endless band of flexible material, or metal, or wood jointed together in lengths; it is passed partly round the peripheries of two or more wheels, and kept in its place by flanges on the wheels, forming a way for the wheels to roll upon, and in coupling two or more carriage wheels by a connecting rod, cog-chain band, or friction wheels, but this coupling does not apply to railway locomotives.

HERAULT, O. *Improvements in apparatus for producing aerated waters.* (A communication.) Dated June 24, 1857. (No. 1760.)

This consists in an apparatus in which the liquid to be aerated while in the apparatus is kept free from any metallic contact.

VASSEROT, C. F. *Improvements in the permanent way of railways.* (A communication.) Dated June 24, 1857. (No. 1762.)

This relates—1st. To a method of constructing the chairs of railways, and of applying them to sleepers. 2. To the construction and form of rail. 3. To securing the rails to the chairs. 4. To jointing the rails. 5. To connecting together the longitudinal and transverse sleepers. It requires engravings to illustrate it.

PARKES, A. *Improvements in coating metals with other metals.* Dated June 24, 1857. (No. 1766.)

Here zinc in a granulated state, or other metal positive to the metal to be coated, is added to the coating solution, which may be prepared as if it were to be used for depositing metals with a galvanic battery in the ordinary way of electro-deposition.

CHURCH, J. *Improvements in the manufacture of artificial fuel.* Dated June 24, 1857. (No. 1767.)

Here sifted breeze is combined with coal or other tar to produce a cohering mass, which is put into a retort and subjected to heat; and when the volatile products have been driven off, the mass, whilst still kept heated, is subjected to the action of streams of electricity.

MUNTZ, G. H. M. *Improvements in the manufacture of metal tubes and axles or shafts.* Dated June 24, 1857. (No. 1769.)

The documents relating to this invention are with the law officers under objection.

BOURRY, E. A. *Improvements in apparatus or machinery for working, expressing, and moulding clay and other plastic materials.* Dated June 24, 1857. (No. 1771.)

This refers to the arrangement of a series of receiving boxes in which the clay, &c., is placed. The inventor combines several receptacles, and places them around a central vertical axis on which they are free to rotate. They are further supported underneath by rollers traversing rails. He forms these receptacles open at the top, and provides each with an opening in the side near the bottom, which openings are furnished with mould plates through which the plastic material is expressed. Above these receiving chambers he mounts a steam cylinder furnished with a suitable piston, and rod or trunk depending therefrom, the lower part of which forms the piston that takes effect on the plastic material in the receiving chambers below.

JOHNSON, J. H. *Improvements in the preparation of surfaces for receiving printings or printed impressions thereon.* (A communication.) Dated June 24, 1857. (No. 1773.)

Here the surface of the material is coated with a composition made by boiling well-washed rice in water, there being just sufficient water to prevent the rice burning; whilst boiling, a small quantity of pulverized borax, gelatine, isinglass, or best white glue, are added. With this rice paste equal

quantities in bulk of white lead (or flake white), best Paris white, and white pipe-clay are mixed with linseed oil (either boiled or raw), and ground fine, so as to form the whole into a thick composition, which, when spread evenly on any required surface, and sufficiently dry, will possess an absorbent ground, insoluble in boiling water, and capable of receiving impressions or colours.

BROOMAN, R. A. *An improved composition or polish for maintaining the brilliancy of varnished or patent leather.* (A communication.) Dated June 24, 1857. (No. 1774.)

This consists of 187 parts of white or yellow wax, 500 parts of essence of turpentine, 62 parts of gum arabic, 62 parts of ivory black. Various colours may be given to the composition, but the above substances will produce a black polish. Any desired colour may be produced by the admixture of suitable colouring matter.

BOURRY, E. A. *Improvements in kilns or ovens for burning or baking bricks, tiles, and other earthen or ceramic matters.* Dated June 25, 1857. (No. 1778.)

This consists in so arranging an oven or kiln in compartments that, while the matters are contained in the kiln or oven, they shall first be gradually heated, and subsequently completely burned or baked, and afterwards gradually cooled before being removed from the kiln or oven.

PROVISIONAL PROTECTIONS.

Dated January 7, 1858.

24. Joshua Kidd, of Bridge-parade, Bristol, civil engineer. Improved apparatus for regulating the pressure and supply of steam, gas, or other rarified or compressed bodies, and for causing more perfect combustion of the gases procured from coal, and increasing the heating and illuminating power of the said gases.

Dated February 9, 1858.

240. Richard Millard, of Duncannon-street, Trafalgar-square, military outfitter. A portable chair.

Dated February 13, 1858.

275. John Duncan, of Greenock, manager. Improvements in the manufacture of ornamental chenille fabrics.

Dated February 20, 1858.

338. Joseph Sworn, of Churton-street, Pimlico, builder, and Thomas Weston, of Churton-street, Pimlico, Jeweller. An improved adhesive composition for whitening and clearing the surface of stones.

Dated March 1, 1858.

398. Thomas Mills, of Partick, Lanark, engineer. Improvements in apparatus for treating and dressing flour or reduced grain.

Dated March 3, 1858.

416. Willem Henderk's Sleeboom, of Hamburgh, surveyor to the French "Lloyds." Improvements in the construction of the keel of ships or other vessels.

418. George and John Kirkley, of Salford, near Manchester, slaters. Improvements in perforating slates or similar materials.

424. John Fowler, jun., of Cornhill. Improvements in apparatus employed in laying down electric telegraph cables.

Dated March 4, 1858.

426. Charles Hart, Phillip Gibbons, and Henry Gibbons, of Wantage, Berkshire, agricultural engineers. Improvements in the construction and arrangement of combined thrashing and winnowing machines, and in the application of animal power thereto.

427. James Millar Ure, of Glasgow, engineer. Improved apparatus for lifting the driving wheels of a locomotive off the rails, and which can be used when the locomotive is either running or stationary.

428. George Frederick Hipkins, of Birmingham, manufacturer. Improvements in constructing and attaching knobs and spindles, and in connecting knobs to doors, drawers, and other articles.

429. John Knowelden, of Southwark, engineer. Improvements in obtaining motive power.

431. John Dewar, of Edinburgh, boot maker. Improvements in the manufacture of boots and other coverings for the feet.

432. Charles Patrick Stewart, of Manchester, engineer, and David Graham Hope, of the same place, civil engineer. Improvements in locomotive and other engines.

434. Paul Moore, of Birmingham, manufacturer. An improvement or improvements in the manufacture of hinges.

435. Thomas Cowper, of Douglas, Isle of Man. Improvements in the construction of ships or vessels, and the method of discharging bilge water therefrom.

437. William Thomson, Doctor of Laws, Professor of Natural Philosophy in the University and College of Glasgow. Improvements in apparatus for applying and measuring resistance to the motion of rotating wheels, shafts or other rotating bodies.

Dated March 5, 1858.

438. Charles Boyce, of Tipton, Stafford, anchor smith. A new or improved anchor.

439. Henry George Collins, of Paternoster-row. An improved method of obtaining impressions on an enlarged or diminished scale from engraved plates or other printing surfaces.

440. Alfred Garratt Barham, of Bridgewater, Somerset, merchant. Improvements in the manufacture of gypsum.

441. Charles Fréderic Vasserot, of Essex-street, Strand. Improvements in the manufacture of wrought-iron wheels for locomotives, tenders, waggons, &c. A communication from F. Dory and J. Badin, of Lyons.

442. Nicholas Common, of Rose-hill, Brighton, engineer. An improved arrangement of water supply valve.

443. James Ferguson Cole, of Devonshire-street, watch and chronometer maker. An improvement in watches and other time-keepers, and an improved escapement wheel or pallet to be employed therein.

445. Charles Frederick Parsons, of Duke-street, engineer. Improvements in machinery for producing and revivifying animal charcoal.

446. John Henry Johnson, of Lincoln's-inn-fields. Improvements in railway signals. A communication from J. J. E. Lenoir, of Paris.

Dated March 6, 1858.

447. Charles Robert Moate, of Old Broad-street

broker. Improvements in the permanent way of railways.

449. Samuel Wheatcroft, of Brudenell-place, Hoxton. The manufacture of cap-fronts, and applicable to the manufacture of ruches and ribbon trimmings.

451. James Syson Nibbs and James Hincks, of Birmingham, manufacturers. Improvements in oil and spirit lamps.

453. William Wilkinson, of Bayswater, engineer. Improvements in the means of facilitating communication across seas or other waters, parts of which are applicable to telegraphing on land.

455. Edmund Burke, of Upper Thames-street, iron tube manufacturer. An improvement in applying iron tubes to locomotive and other tubular steam boilers. A communication.

457. William Reed, of Westgate-street, Newcastle-on-Tyne. Improvements in the permanent way of railways.

459. Antoine Sainte Marie Derouen, of Paris. Improvements in machinery for combing fibrous substances.

461. John Henry Johnson, of Lincoln's-inn-fields. Improvements in the production of aluminium and its alloys, and in the production of other metals, the oxides of which are not reducible by charcoal. A communication from L. P. B. E. Cumenge, of Paris.

463. Eugène Morel, of Ghent, Belgium. Improved machinery for drawing fibrous substances. A communication.

Dated March 8, 1858.

465. George Redford, of Manchester. Making bullet-cartridges of one continuous piece of metal.

467. Thomas Lyne, of Malmsbury, Wilts, draper. An improved harrow.

469. John Young, of Wolverhampton, manufacturer. An improvement or improvements in the manufacture of hinges.

471. James Palmer Budd, of Ystalyfera Iron Works, Swansea. Improvements in the smelting or refining of tin, tin ores, and tin scruff.

Dated March 9, 1858.

473. Mariano Casentini, of Westminster-road, Lambeth, modeller. Improvements in preparing and indurating plaster, in preparing surfaces to receive plaster, and in preparing or perfecting plaster surfaces.

475. Robert Skene, of Garmouth, Elgin, manufacturer. Improvements in obtaining motive power from water.

477. George Fellows Harrington, of Ryde, Isle of Wight. Improvements in the manufacture of artificial teeth, and in the beds and palates for teeth.

479. John Henry Johnson, of Lincoln's-inn-fields. Improvements in the manufacture of stockings and other hosiery goods. A communication from J. N. Poivret, of Troyes.

Dated March 10, 1858.

481. George Davies, of Serle-street, Lincoln's-inn. An improved eye or ring bolt. A communication from M. M. Camp.

483. Benjamin Beale, of East Greenwich, engineer. An improved method of cutting and shaping spokes.

485. George Stevens Andrews, of Charlwood-street, Pimlico, machinist. Improvements in washing machines.

Dated March 11, 1858.

487. George Davies, of Serle-street, Lincoln's-inn. Improvements in life-boats. A communication from M. M. Camp.

489. James Young, of Glasgow, manufacturing chemist. Improvements in lamps.

491. John Doddridge Humphreys, of Charlotte-street, engineer. Improvements in machinery for moulding, compressing, and solidifying artificial fuel and other substances capable of being compressed.

493. François Auguste Verdeil, of Rue St. Sulpice, Paris. Improvements in treating madder.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," March* 23, 1858.)

2833. G. Weedon and T. T. Weedon. An improved knife-cleaning machine.

2836. W. Devon. An improved self-acting apparatus for flushing water-closets and the means of connecting the same to water-mains, parts of which are applicable to the junction of gas or water pipes generally.

2842. J. Harrington. Improvements in apparatus for pointing pencils or marking instruments.

2847. O. W. Wahl. Improvements in manufacturing farinaceous products from potatoes. A communication.

2848. I. Taylor. Improvements in apparatus used in printing calico and other fabrics when cylinders are employed.

2851. J. Williams. An improvement in coupling and connecting carriages on railways.

2860. W. J. M. Rankine. Improvements in fan-blowers.

2866. J. Macintosh. An improvement in preparing telegraphic wire, which is coated with gutta percha in order to render it more capable of resisting heat, and in laying down telegraph wires in the sea.

2868. M. Henry. Improvements in electric and galvanic conductors, and in the mode of and machinery or apparatus for manufacturing the same. A communication.

2875. J. Taylor. Improvements in dredging machines, which improvements are also applicable to other purposes.

2881. W. Pidding. Improved manufactures and improvements in the manufacture of piled fabrics, or of mosaic or tesselated, textile, and other fabrics, and improvements in some of the machinery or apparatus necessary to produce them; also the application of certain existing or known machinery or apparatus for their production.

2892. A. F. Germann, F. G. Germann, and J. Germann. An improved propeller.

2909. J. Clarke. Improvements in the construction of shafts and poles for cabs, omnibuses, and other vehicles.

2917. J. Denton. Improvements in looms.

2918. H. Walker, J. Beaumont, and J. Gothard. Improvements in steam-engines.

2920. P. A. Brussaut. An improved anti-friction apparatus for shafts, axles, and other revolving surfaces.

2927. J. M. A. E. Fabart. Improvements in looms for weaving.

2977. C. Goodyear. Improvements in the manufacture of buoyant fabrics, which are applicable to the manufacture of garments, carpets, rugs, cushions, mattresses, bags, and various other useful articles.

3117. T. Hart, jun., and A. Jones. Improvements in looms called Dobby Looms.

3200. J. Long. Improvements in the construction of sewers and in the means of discharging the contents thereof.

18. G. E. Dering. Improvements in electric telegraphs, and in the manufacture of insulated wire and cables.

85. W. Waller. Improvements in thrashing machines, or machinery for thrashing and dressing grain.

135. G. E. Dering. Improvements in the permanent way of railways.

158. W. T. Fox. Improvements in the bending and reefing of ships' and other vessels' sails, together with a new application for the leeches and foot.

345. R. A. Brooman. An improvement in treating ores of precious metals. A communication.

346. R. A. Brooman. Improvements in machinery for effecting the amalgamation of precious metals. A communication.

383. W. C. Smith. Improvements in the manufacture of envelopes for letters and other purposes. A communication.

391. W. A. Gilbee. An improved union joint for gas, water, and steam pipes, also applicable to the branch pipes of fire-engines. A communication.

416. W. H. Sleeboom. Improvements in the construction of the keel of ships or other vessels.

426. C. Hart, P. Gibbons, and H. Gibbons. Improvements in the construction and arrangement of combined thrashing and winnowing machines, and in the application of animal power thereto.

436. C. Eyland. An improvement or improvements in certain descriptions of buckles.

437. W. Thomson. Improvements in apparatus for applying and measuring resistance to the motion of rotating wheels, shafts, or other rotating bodies.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

616. Richard Edward Hodges and Charles Murray.
618. William Smith.
625. Benjamin O'Neale Stratford, Earl of Aldborough.
630. Alfred Vincent Newton.
647. James Willis.
655. William Brown.
661. John Britten.
663. John McKinnell.
668. Francis Crossley.
680. George Leonard Turney.
811. Isaiah Vernon.

LIST OF SEALED PATENTS.

Sealed March 19th, 1858.

2448. Elizabeth Burton West.
2456. Ramsey Lawson.
2457. Hesketh Hughes.
2463. Frederick Collier Bakewell.
2469. William Beckett Johnson.
2471. Augustin Vrain Adrien Laugère.
2476. Leopold Newton.
2493. William Bowler.
2546. Charles Reeves.
2547. William and George Richardson.
2550. Michael Henry.
2618. Meliton Martin.
2688. Alfred Vincent Newton.

Sealed March 23d, 1858.

2474. John Barber.
2475. John Kelshaw and John Wilkinson.
2484. Joseph Lewis.
2490. Robert Kay.
2498. William Wall White and William Bull.
2506. William Edward Newton.
2565. Augustus Applegath.
2571. Thomas Forsyth.
2595. Francis Alton Calvert.
2626. John Henry Johnson.
2627. Edward Owen.
2673. Edward Cockey, Henry Cockey, and Francis Christopher Cockey.
2753. George William Robinson.
2755. Joseph Boys Fraser.
2769. Richard Martin, Ebenezer Hall and Joshua Hall.
2931. John Henry Johnson.
3022. James Sinclair.
3037. Henry Dolman.
3165. Alexander Chaplin.
30. Edwin Maw.
72. James Austin.
73. Robert Archbald.
81. Thomas Hamilton and James Hamilton.
91. Thomas Pirie.
102. John James Russell.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Dates of Registration.	Nos. in the Register.	Proprietors' Names.	Addresses.	Subjects of Design.
Feb. 24.	4061	Bell & Black	Bow-lane	Match Box.
26.	4062	J. Lang	Cockspur-street	Self-acting Lever for removing Cartridges from Breech-loading Guns and Rifles.
March 1.	4063	T. Pettiver	Trinity-street, Islington	Swing Kettle-stand.
4.	4064	R. Ramage	Holywell-street	Self-acting Valve.
9.	4065	W. Reichenbach	Borough-road	Gas or Air-pressure Gauge.
10.	4066	R. F. Sturges	Birmingham	Metal for Forks, Spoons, &c.
17.	4067	T. Pemberton and Sons	Birmingham	Door Catch.
19.	4068	H. Thompson	Strand	Parts of Bedsteads, Chairs, &c.

PROVISIONAL REGISTRATIONS.

Feb. 26.	963	B. W. Jonas & D. Stothard...	Spitalfields and Lambeth ...	Hook for connecting Railway Carriages.
March 1.	964	W. Herring	St. John's-street	Curved Tooth-brush.
6.	965	D. Jones...........................	Birmingham.....................	Cinder Sifter.
16.	966	A. Turley	Worcester	Needle-case and Reel.
20.	967	W. Ludlow	Birmingham......................	Letter Box.
,,	968	W. M. Tollit	Alderney, Channel Islands	Chimney Cowl.
,,	969	J. H. Riddell......................	Cannon-street	Trowsers' Guard.

NOTICE TO CORRESPONDENTS.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

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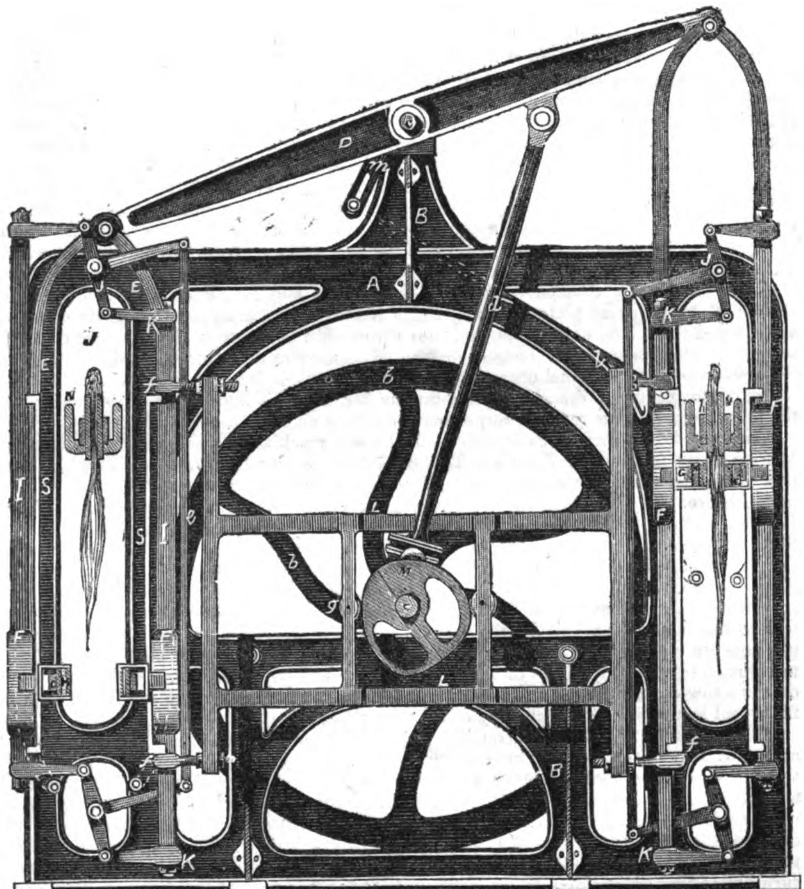
Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London.

ROWAN'S PATENT SCUTCHING AND HECKLING MACHINERY.

Fig. 1.



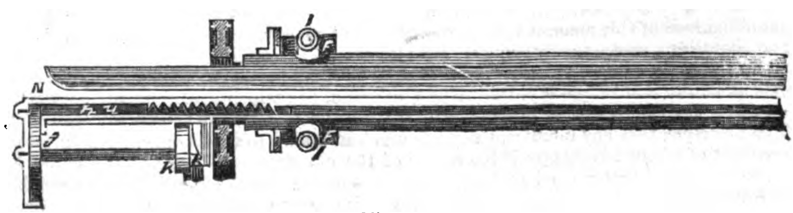


Fig. 3,

ROWAN'S PATENT SCUTCHING AND HECKLING MACHINERY.

MR. W. ROWAN, of the enterprising firm of J. Rowan and Sons, Engineers, Belfast, has patented certain improvements in scutching and heckling flax, &c., and in machinery employed therein, from which very important results have been obtained, especially in relation to the manufactures of Ireland. The flax, straw, or other vegetable substance, after undergoing the usual process of retting or other preliminary preparation, is securely held at about the middle of its length by a holder (such as is used at present with heckling machines, for example), and is slowly traversed across the machine, and a pair of jaws is made to nip the flax or straw, and then recede from the holder. These jaws are armed with plates of metal, either plain or toothed on the edges, the plates on one jaw alternating with those on the other jaw, and these bend and break the boone or woody part of the flax or straw between them, and draw it away from the fire. When the jaws have travelled beyond the end of the fibres, they are made to open and then approach the holder ready to repeat the operation just described; and this nipping and drawing action is continued until the holder has reached the side of the machine opposite to that where it entered. The holder is then taken out of the machine, and the straw reversed end for end in it, and precisely similar operations are performed on the end of the straw previously untouched.

The second part of the invention for heckling or dressing the fibre is performed in a machine similar to the above, except that, instead of plates of metal, the jaws are armed with heckle pins, which are strong and set wide apart at the side of the machine where the operation begins, and are progressively finer and closer set from this side to that where the operation finishes.

The tow which is combed out by the heckle pins and gets entangled about them is cleared off by stripping plates or rods, which receive a motion so as to alternately expose and conceal the points of the pins, and thus throw off the tow from them. The patentee sometimes also makes use of brushes instead of heckle pins affixed to the finishing ends of the jaws to perform the final operation.

Before proceeding to describe more minutely Mr. Rowan's improvements, we will quote the following sagacious remarks respecting them from an Irish paper of high standing :—

"In Saturday's paper we gave a sketch of the new machine just patented by the Messrs. Rowan, of the York-street Foundry. This remarkable implement, taken in all its bearings, promises to be one of the most valuable of all the later inventions connected with the linen manufacture. For some years past the average extent of land under the growth of flax in Ireland has been 100,000 acres. It is well known that in the yield of medium quality of fibre this country is not equalled by any other in the world, and that, were we to grow three times the usual breadth of flax, there would be ample demand for all the produce. Any system of scutching, therefore, which would increase from a given quantity of flax straw the produce of marketable fibre must be hailed as one of the highest importance, as well to the manufacturer as to the farmer. The more valuable properties of this new machine are a greater yield of flax, an immense saving of labour, an adaptability of the mechanism to suit all qualities of flax straw, and the less powerful action of the implement on the straw during the process of scutching, so as to produce a more equable length of fibre, and less of what is technically called 'short flax.'

"The average yield of medium quality of flax in Ireland is about thirty-five stones to the acre, but taking the fine and coarse fibres, the produce would not exceed thirty stones. Off 100,000 acres, then, we may assume the yield to be 500,000 cwts., or 25,000 tons annually for that breadth of land. Under the existing mode of scutching, the yield of marketable fibre from 112 lbs. of flax straw is about 17 lbs., supposing the straw of fair quality. A similar description of straw scutched by the Rowan patent will produce 24lbs., to the cwt., or say an addition of 33 per cent. Now, if we put that average to the gross turn-out of Ireland's flax lands, we would have 666,666 instead of 500,000 cwts., the value of which addition would be about 375,000*l.*; and if we add to that figure the difference in value created by superiority of finish, it would leave the total at about half a-million. An annual increase of this amount to the proceeds of one national product should be a matter of no slight importance to any country, but still more to Ireland.

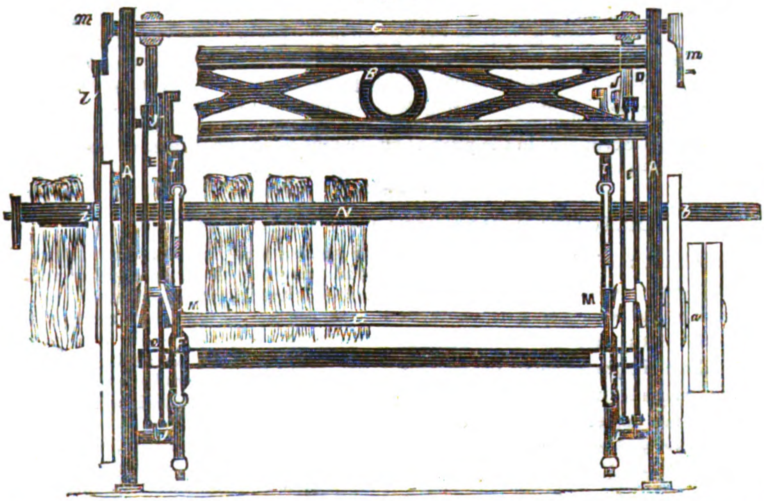
"By the use of Rowan's new machine, the farmer will be able to produce from his flax lands an addition of fully one-third. The quantity of flax which it will prepare for market in a single day equals that of five stands on the ordinary system, and so easy and so simple is the principle, that any intelligent day labourer can attend to it with ease. Not the least important of all the advantages is the saving of the old process of rolling flax—an operation so dangerous that many have lost their lives, and still more their limbs, while attending the rollers on the old system. The farmer, the flax-spinner, and the linen manufacturer are each and all especially interested in the success of this new effort of local genius.

Much as the world owes to the Messrs. Rowan for other triumphs in mechanism, still greater is its indebtedness for the patent scutching machine."

Having set forth the essential features of the invention, we proceed to describe its nature more fully, and also the manner of carrying it into practical effect, commencing with the arrangement employed for heckling, and premising that for both purposes the machine is exactly similar, except in the appliances or tools which act immediately upon the fibrous material.

In the accompanying engravings, Fig. 1 is a transverse section of a machine constructed for carrying into effect the improvements for heckling; Fig. 2 is a longitudinal section; and Fig. 3 part of a ground plan of the same machine. A, A, are open frames of cast iron, one at each end of the machine, and connected together by the cross frames, B, B, B; C is a shaft with cranks on it near the ends, and having on it the driving fast and loose pulleys, *a*, *a*, and the fly wheels, *b*, *b*, for equalising the motion; D, D, are two beams or rocking levers fixed on an axle, *c*, and receiving a rocking motion from the cranks by the connecting rod, *d*: E, E, are links by which the sliding sockets, F, F, are suspended from the rocking levers. Instead of connecting these links direct to the rocking levers, the patentee sometimes, when the curved line traversed by the ends of the rocking levers is objectionable, connects the links, E, E, to the rocking levers by the intervention of slides and links, or by other means of producing parallel motion. To the sockets, F, F, are fixed the bars, G, G, of iron or wood, to which are bolted the stocks of the heckle pins, H, H.

Fig. 2.



The joints by which the sliding sockets, F, F, are attached to the links, E, E, are situated considerably below the sockets; the object of this will be seen presently. The sliding sockets, F, F, work up and down on the guides, I, I, and these again are carried by the triple levers, J, J, to which they are jointed by the crossheads, K, K. The horizontal limbs of the levers, J, J, are connected together by the upright rods, *e*, *e*. Thus the upper and lower levers, J, J, being similarly affected, the guides, I, I, are at all times constrained to be parallel with each other. L, L, are frames attached by the adjusting screws, *f*, *f*, to the vertical guides, I, I, causing the movements of all the vertical guides to be simultaneous; M, M, are two cams keyed upon the crank shaft, and made of such a form as to allow the motion produced by them to be as quick as convenient, with intervals of rest between the successive movements; *g*, *g*, are friction rollers on which the cams act, and which, being carried by the cam frames, L, L, communicate a reciprocating motion to them, and also to the vertical guides and all connected therewith; N, N, are slides or galleries in which are placed the holders retaining the flax. These galleries are attached to the side frames of the machine at such a height as to just clear the heckle bars when the latter are at their top stroke, and have each a screw, *h*, at the end; at the end of the screw is a small pinion gearing into a wheel, *j*. On the same spindle as the wheel, *j*, is a ratchet wheel, *i*, with a lever and pawl, *k*. This lever is in connexion by the rod, *l*, with the lever, *m*, on the axle

of the rocking levers, and thus motion is communicated to the screw, *h*. The flax holders have projecting pieces on their sides, which take into the threads of the screw, and they thus receive a progressive motion across the machine as long as fresh holders are supplied by the attendant, that which is last supplied pushing all the others before it. S, S, are shield plates attached to the guides, I, I, their object being to prevent the flax and tow adhering to the greased surface of the guides, I, I. The cams, M, are so set, as regards the position of the cranks, and the direction in which they revolve, that the heckles shall be closed together immediately before they commence their descending stroke, and, consequently, they will open just before the commencement of their ascending stroke. The combing action on the flax, therefore, takes place when the heckles are moving downwards only, and during the time they are rising the screw receives rotary motion by the means described, and urges the flax holder a step forward ready for the repetition of the combing action, till at length the holder arrives at the end of the machine, and the heckling process will be finished on that end of the flax which is thus far operated upon. The attendant now unscrews the holder, and inverting the flax, end for end, in it, again screws it up, and passes it to the other side of the machine to repeat the process. The rate at which the holder traverses the machine is regulated at will by lengthening or shortening the lever, *m*, which, with this object in view, is made with a long slot to receive the joint pin of the rod, *l*. Any tow combed out from the flax and adhering to the heckle pins may be removed from them by causing the stripping bar to recede.

The patentee prefers to arrange the heckle pins in alternate blank and full sections, the blank spaces on one bar being opposite to the full spaces on the opposed bar, and he also has the heckle pins much wider apart at the commencing end than at the finishing end, making them progressively finer from the former to the latter. He also finds it useful to substitute a section of plates of metal in place of heckle pins at the commencing end of the machine. The depth to which the heckle pins penetrate into the flax is regulated by the adjusting screws, *f*, *f*, which connect the vertical guides with the cam frame.

In adapting the machinery for scutching purposes, he uses precisely the arrangement above described, except that in the place of heckle pins he employs plates of metal attached to the bars, G, G.

ELECTRO-MAGNETISM AS A MOTIVE POWER.

THE application of electro-magnetism as a motive power was the subject of an able paper read at the Society of Arts, on Wednesday, the 24th ult., by Mr. Thomas Allan, whose improvements in electro-magnetic engines have frequently been noticed in our pages. The question was boldly handled by Mr. Allan, and the feeble objections advanced against the use of electro-magnetism for motive purposes met with a searching and destructive investigation. We now reproduce his lecture *in extenso*:—

It is superfluous to enumerate the many material advantages electro-magnetism has over steam, from its great simplicity, compactness, constant power at all velocities, and being entirely under control. With no reservoir of danger, as in the steam boiler,—always ready for action, without previous consumption of materials, as in getting up steam,—and no waste in freightage, as in carrying coal.

The two points to solve in the use of electricity as a moving power are its application and economy.

Hitherto, every application of electro-magnetism that has been put to a practical trial has been at variance either with the laws of electricity or mechanics.

It, therefore, now only remains to be shown that electricity—the *most powerful agent in nature*—by an application in *conformity* with its known laws and properties, can be rendered available as a motive power.

The power of electricity, when applied in the form of an electro-magnet, is wonderfully great from comparatively small means; but its dynamic effect decreases so rapidly through the intervening space, being "inversely as some unascertained power of the distance much higher than the square," that the range of the maximum effect or valuable portion of the dynamic force, with a consequent minimum of consumption, extends to so small a distance as to be of no real value in mechanics. The great problem to solve has been to contrive such an arrangement of parts as to convert this maximum of the dynamic effect, through a range, although unavailable in itself, into *stroke*, or such an extent of motion as to be available and of practical value as a motive power.

In the plans and arrangements of these inventions the maximum portion only of the dynamic effect is applied, and, by the

mechanical arrangement of parts, is successively and continuously brought into action in a direct form, in accordance with the laws of electro-dynamics. When thus applied, there is no loss of the primary electric force, and any amount of *power* and any *length* of *stroke* can be obtained.

The cost of electro-motive power has generally, though erroneously, been considered so great as to render electricity as a motive power less profitable than steam. But this has arisen from the misapplication of the electro-magnetic force, not from the necessary consumption of the electric materials, which consumption is inversely as the dynamical ratios of the force.

The introduction of electro-motive power will be an event of great national importance, tending to alter the value of every article of commerce and manufacture, as steam has done since its adoption.

It is a due consideration of the foregoing summary of a most interesting and important problem in physical and mechanical science, still progressive, that forms the subject of the present paper; and although the final solution is still to be worked out, I will endeavour to detail some of the obstacles, as well as the *modus operandi* entered upon, so far as they have progressed, to effectuate the same.

Notwithstanding the evident vastness and importance of this subject, and the enlightenment of the present age, it is not a little curious to observe with what stubborn resistance and discouragement any such invention or innovation upon vested rights or the routine of bye-gone years is hailed. Electro-motive power *par excellence* seems to meet with fully more incredulity and disbelief in the mind of man now than steam or gas did in their first days. To mention the subject even seriously is to be considered next thing to a lunatic, and the signal to have raised against one a barrier of apparently insurmountable difficulties, the fancies and jealousies of vested interests, the disappointments of various crude and empirical attempts, to say nothing of the dogmas of some professors of a sister science. Some such, with minds of but small powers of philosophical conception, are too apt, with unbecoming flippancy, to crumple up a whole question with a wizard-like *ipse dixit* of impossibilities as to cost, based on anomalous and untested assumptions.

Professor Liebig, in his *Familiar Letters*, goes much out of his way to run a tilt against electro-motive power, and patronisingly remarks, "that electro-magnetism as a motive power is engaging great attention and study; wonders are expected from its application to this purpose; such expectations may be very attractive; indeed, they must be so, otherwise no one would occupy himself with them; and yet they are altogether fallacious; they are illusions depending on the fact that those who entertain them have not made the necessary comparisons and calculations." He then reminds his readers "of what chemists denominate 'equivalents,' and likewise that zinc in the battery is burned (oxidised)—a consequence of which is, the production of an electric current." We are then informed that "out of nothing no kind of force can arise," and "if we were to burn the zinc under the boiler of a steam-engine, consequently in the oxygen of the air, instead of in the galvanic pile, we should produce steam and get a certain amount of force," but that "we must still recollect that zinc can be represented by an equivalent weight of carbon (as coal); so that, according to the experiments of Despretz, six pounds weight of zinc in combining with oxygen develop no more heat than one pound of coal; consequently, under equal conditions we can produce six times the amount of force with a pound of coal as with a pound of zinc." There is in all this no small amount of confusion of ideas pegged upon the experiments of Despretz which cannot fail to mislead, having nothing to do with the mechanical force of magnetism produced by a given amount of current electricity.

It is a most unfortunate doctrine, but also a practical absurdity, to state that zinc cannot give out more power than the coal required to melt it. Doubtless a given amount of zinc combining with oxygen would not eliminate more heat than would overcome that affinity; but there is no such relation of heat to electricity as to make the mechanical power of the one the measure of the mechanical power of the other. Whatever may be the analogy between heat and electricity, they must be considered as distinct forces in their mechanical relations. In the combustion of coal, heat only is the motive power developed; whereas in the oxidation of zinc in the battery, both heat and electricity are developed—the latter only being the motive force.

Prof. Page on this subject remarks,—"The absolutism of forces regulating affinities may be interesting as a matter of speculation, but as furnishing a practical estimate for the amount of mechanical or available power it cannot stand, and necessarily involves the unwarrantable assumption that the whole power or inherent force may be eliminated and rendered available in each case." But Liebig goes still further. He maintains that the heating power of the current is the equivalent of the mechanical

power through electro-magnetism; or, in other words, that the heat developed by the passage of the current ought to raise steam enough to furnish a power equivalent to the electro-magnetic power of the same current; and from the fact that the mechanical force derived from the steam raised by the heating power of the current is so small compared with that obtained by the combustion of coal, he arrives at the conclusion that electro-magnetic power "can never be used."

The cost, however, of such a power is but a subordinate question, as other and more important points have to be settled first before the cost can be fairly ascertained.

The speculation is thus pushed up to a point where facts are brought to bear upon it, and fortunately where facts enough can be adduced to subvert the whole doctrine.

Desiderating cause and effect, and taking a practical survey of the whole subject, the problem appears to resolve itself more into one of mechanics and mathematics, than of chemical equivalents, for, let the cost of a given amount of electricity be what it may, we must see how that is to be economically applied to produce magnetism, in the first instance, and, again, how the dynamic effect of magnetic attraction is to be applied to machinery in accordance with its known laws, and that, too, to produce such an amount of motion or stroke as will be available for motive machinery.

It is to this end, then, that those who choose to think for themselves are not turned aside from the investigations of such a subject by the various discouragements thrown in their path, but, heedless of the dried leaves of theory of those who, without the comparative anatomy of thought, beg the question, seek to apply the dynamic effects of magnetism to machinery.

The power exhibited by electro-magnetism, though very great, extends through so short a space as to be practically useless in mechanics. A powerful magnet might be compared, for sake of illustration, to a steam engine, with an enormous piston, but with an exceedingly short stroke (*per se*), unquestionably a bad arrangement, or, rather, no arrangement at all, yet, if such mechanical arrangements could be devised, so as to take advantage of this enormous piston, and, at the same time, to produce stroke, without militating against that power or increasing consumption, then we would have a machine containing the elements of power and motion, without which the question of the cost of producing the electricity and, still more, its application to produce magnetism, are irrelevant and secondary in the first stages and practical investigations as to producing power and motion in a machine by such agency.

It has, consequently, appeared to me that in working out this problem it should be considered in three distinct parts.

First. How to apply the force of magnetic attraction economically in a machine, taking advantage of its maximum force only with a consequent minimum of consumption, and continuing that power to any length of stroke required.

Second. How to establish the right proportions between a given amount of electricity and the length and diameter of a magnet, so as to produce the maximum of manetic effect with the minimum of electrical consumption.

Third. The economical production of electricity and working of the battery.

Before going into any questions of application, it would be profitable to inquire into the peculiarity of the forces about to be dealt with as a guide to the mechanical arrangements necessary to produce motion and power, with economy in consumption.

The static force of magnetism is, to the casual observer, something immense from apparently very small means; whilst the dynamic effect, which is what we have to deal with, and render available as a moving power in mechanics, is a force peculiar to itself, and differs from all others we have in nature, and therefore requires to be considered *per se*, without reference to, and regardless of, other forces as applied to motive-power.

The dynamic effect of magnetic attraction decreases in the inverse ratio of the squares of the distances, as will be seen if the geometric curves of that force be drawn, measured from some focal point within the surface of the magnet, and as the consumption of zinc in the battery by the electricity so produced is in accordance with the time taken for the attracted body to pass through a given space, it follows that at a certain distance from the magnet where the force produced is least the consumption is greatest proportionately, and on approaching the magnet where the force is greatest, the consumption is least; in a working engine, going at an even speed, the time being equalised, the consumption for each distance passed through would be the same; it will, therefore, be sufficient as a question of economy, to consider the time for equal spaces passed through, as equal, although of the attractive force of itself without a resistance, it may be said, however paradoxical it may appear, that the force, and therefore the velocity, being inversely as the squares, the consumption must be inversely as the forces.

The curve of the dynamic effect drawn from the surface, and the calculations of the squares also, show that if a magnet at an inch distance will sustain a weight of one pound, at half an inch it will hold four; at a quarter, sixteen, and so on. If this curve be further carried out, and the whole distance or range of attractive powers divided into tenths; the sums representing the means of the forces through each increment or tenth of the whole distance respectively, showing that if the mean force of the tenth nearest the magnet be 1,000 lbs., that of the tenth furthest off will only be 3 lbs., and, as we have shown before, when the keeper or material to be attracted moves at an even speed (as in an engine in motion), there would be as much consumption of electricity, and consequently zinc, to produce the 3 lbs. of power, as to produce the 1,000.

Calculating the dynamic effect from the surfaces of the magnets, by the laws of the squares inversely, is only an approximation to the ratios of decrease in the dynamic effect, for, as before mentioned, the forces of attraction must be calculated from some focal point within the surface of the magnet, depending for its position on the length and diameter of the magnet—this unknown point being easily ascertained, whence the mean dynamic power of that portion of the magnetic attraction that has been arranged to be applied and utilised in the engine can be measured and ascertained, so as to calculate the theoretical horse-power of the engine.

In the arrangements adopted to utilise these peculiar forces economically, and likewise obtain stroke, it was necessary, to this end, to form magnets with 4, 6, or 8 poles screwed on flat plates, so as to apply the attractive force in a direct form, and thus by the very simple arrangement of a piston rod passing through the centre of this group of magnets, in a line at right angles to their plane, a keeper resting on a shoulder on the piston rod would meet the surface of the magnets in a plane parallel to itself; the keeper thus not only embraces the full sphere of magnetic attraction, but, by such an arrangement, as the force of magnetic attraction decreases so rapidly with the distance, it is not economical to utilize or apply more than that portion of the attractive force that is most effective, and so not expend the electricity on that which inversely, as the squares, is comparatively of little value, and only produced with a larger proportionate expenditure.

In this arrangement, when the first magnet in the series has, by attracting the keeper, operated on the piston rod, the stroke or onward motion of the rod is continued by a similar operation of the second magnet placed below the first, and so on with the third and fourth. The onward motion of the shaft is then continued by a second rod on a second crank in like manner to the first, and so on by a third and fourth.

It will thus be seen that the motion is continuous, not reciprocating, analogous to the overshot water-wheel—each magnet coming into play one after the other—and that it is that portion of the magnetic attraction only which, proportionately to the power obtained, consumes the smallest amount of electricity, and consequently of battery consumption, that is applied as a motor in engines constructed on these principles. It will not be difficult to perceive by the foregoing how the great and most important results of the whole problem, viz., the economics, may be completely counteracted by a misapplication of this peculiar dynamic effect, whatever it may have cost to produce it; and to illustrate this more clearly, a comparison might be made between the principle of application in the rotary engine (Jacobi's) and the present arrangements. The rotary engine has hitherto been the most favourite form among the various experimental appliances in electro-magnetism as a motive power, but in this mode of application, besides a variety of electrical disadvantages, it will be easily seen, having to apply the attractive power in a slanting direction, in place of direct, that there is of necessity a great waste of the magnetic force, that it is the upper portion of the curve only that can be applied effectively, whilst, as the magnet has to be demagnetised in time to allow the keeper to pass, the maximum of the force has to be abandoned. On the other hand, in the present arrangements, the application being direct, it is the maximum only that is utilised.

To carry out the comparison still further in the rotary system, about 8-10ths only of the dynamic curve can be made available, the eight upper sections as against the two lower in the present system, where attraction is direct. This would give in the former a mean force of 12 through a given space, as compared to 555 in the latter, with an equal consumption of electricity, making a difference in cost as to the power utilised as 46 to 1, and even supposing the rotary system could be practically worked so as to utilise 9-10ths of the curve, the ratio of cost would still be in favour of the latter as 24 to 1.

Theoretically, this would be a great stride in the right direction as to cost, and almost conclusive, if we could depend on a state-

ment in a paper of Mr. Hunt's to this Society some years back, that electro-magnetism as a motor was impracticable, the cost being in an engine on Jacobi's principle a hundred-fold as compared with steam. Upon this showing, so far as the utilization of the magnetic curve goes, all else being equal, the relative difference in cost of steam and electro-magnetism as a motor becomes reduced to something within reasonable bounds.

In the second part of the question, as to the proper proportions of parts so as to produce the maximum of magnetic effect with the minimum of electrical consumption, there is much still to be investigated, as there seems to be no law yet worked out that would be a true guide on this subject. I have given much consideration to this point, and have obtained many practical data toward the great question at issue.

As an instance of misapplication of current force, I may mention an extreme case, indicating, by comparison, great consumption or waste and little effect. A magnet with an electrical consumption of 352, gave out a supporting power of 2¾ cwt., at half-an-inch distance from the surface of the magnet, whilst another with the same battery, and a consumption of 512 (owing to the shortness of the circuit) only gave out an attractive power of 48 lbs. at the same distance. In another case, where two magnets of different diameters and circuits consumed exactly the same amount of electricity, the one gave out an attractive force at a certain distance of 97 lbs., where the other gave 476 lbs. at the same.

These two cases, although extreme ones, clearly show where the important question of costs, to a certain extent, lies, and that, without complete investigation, and the establishment of well-defined data, as to proportions relatively, so as to produce the maximum magnetic effects with the minimum of electrical consumption, the economics of the question, as regards this section of it, will still be a varying quantity, and, as hitherto, greatly left to chance.

In the third portion of the question, viz., the economical production of electricity, it may with safety be remarked that, with all its improvements, the battery is but a clumsy affair; what, then, may we not expect from a series of scientific researches into the as yet undeveloped secrets of this marvellous element.

It must be obvious, from the foregoing, that, as I stated at first, electro-magnetism as a motive power was not simply a question of chemical equivalents or of producing electricity cheap, but more essentially to ascertain the economical application of it to produce magnetism, in the first instance, and then to contrive such an arrangement of parts as will produce stroke or motion in a machine along with an economical application of that force when so produced. It, therefore, follows that, without a properly combined investigation of these three questions as a whole, and an application of forces in accordance with their known laws, it would be but a waste of time, barren of results, as appears to have been the case hitherto with many expensive experiments made in various countries, disregarding this triplicate application of dynamics in mechanical and physical science.

I have not in this paper entered into the mass and minutiæ of detail, as only tending to confuse, and other obstructions that yet stand opposed to ultimate and complete success, but have treated the subject generally, and as a progressive one, so as to bring out with as much force of character as possible the broad features of this interesting problem, and the main principles of the applications of the forces by which it is ultimately to be solved.

I have only now to repeat what I started with, that "hitherto every application of electro-magnetism that has been put to a practical trial, has been at variance either with the laws of electricity or mechanics," and also, that "the power of electricity, when applied in the form of an electro-magnet, is wonderfully great from comparatively small means, but its dynamic effect decreases so rapidly through intervening space, that the range of the maximum, with a consequent minimum of consumption, extends to so small a distance as to be of no real value in mechanics; the great problem to solve is how to contrive such an arrangement of parts as to convert this maximum of the dynamic effect through a range, although unavailable in itself, into *stroke*, or such an extent of motion as to be available and of practical value as a motive-power."

Confident, therefore, that the principles on which the mechanical and physical applications of the electrical and magnetic forces are based, and as enunciated in the foregoing, to obtain the elements of motion and power in a machine by such agencies, are correct, in fact, having not only hit upon the right principle, but laid the foundation for its adoption, I feel every incentive, and a strong impelling power besides, to carry forward such investigations, despite all discouragements, feeling assured that the difficulties in details will, in due time, yield to further knowledge and experience of the phenomena of the peculiar forces under investigation, so as to render

electro-magnetism as a motive-power a practical and useful agent in the various works of man.

We have witnessed the great revolutions effected by steam within the last forty years, both on sea and land; it is an agent continually advancing, exercising incalculable influence on the wealth, and not less decidedly on the moral progress of nations—in one word, contributing to the march of civilisation throughout the globe—furnishing an apt illustration of the oft-repeated adage, "Knowledge is power." Rapid as have been the advance and expansion of steam-power, with its manifold applications to the wants of mankind—remarkable as its progress may still be, it cannot be disguised that a new motive power is perhaps the great desideratum at the present stage of mechanical science. There is a growing want felt; the requirements that have been mainly evolved through steam itself having apparently outstripped the agency that has called them into being.

The introduction, therefore, of electromotive power—its bearings upon all questions of commerce, manufacture, and civilization at home and abroad, opens up to the contemplative mind of the political economist a wide field of speculation, and becomes a question of great national importance, tending as it must to further alter the relative value of every article of commerce and manufacture as steam has done since its introduction.

If, then, with electricity, we can produce motion and power in a practical and useful form, and so carry forward for the benefit, advancement, and civilization of mankind, that good work so happily commenced by steam, what a grand problem will then be solved.

The unphilosophical manner in which some people allude to electro-motive power superseding steam, is of a nature greatly to excite prejudice against a due consideration of the political economy of such agencies. Common sense, and a proper deference to the philosophy of common things, indicates that electro-motive power will no more supersede steam than steam the water-wheel, as each and all have their own field of operations and functions to fulfil peculiar to themselves; the cost, the power, and the various advantages of either being relative to the requirements of their respective applications as motive forces.

It will suffice to give a brief sketch of some of the many advantages such a motive power has over steam. A motive-power without fire at once stamps it with peculiarities due to itself alone, and indicates a field of operation in which it can have no competitor. It can thus be applied, where the cost of insurance precludes the use of a steam-engine, such as the hoists in the large Manchester warehouses, where they have not been built on purpose. There are also a variety of other instances where a small engine may be used, as in each flat of a mill, thereby getting rid of all the communicating gearing, the first cost of such gearing, the power to work the same, as also the saving when the mill was working half time, the dinner hour, and in getting up steam. Its application, likewise, as a small power, to house and workshop purposes in town and country, where steam does not venture to intrude as yet, or is entirely disallowed, for various reasons besides fire and the cost of insurance. England, with its cheap fuel, might at first sight appear as the most barren field for its operations; but, from its apparent completeness as a small power, it becomes applicable as an auxiliary agent, in a host of conditions where steam is quite inapplicable; it may be said it has a wide field of operation peculiarly its own as a small power; there is no reason to suppose that it is inapplicable to larger powers, although it might be rash in its present state of infancy to predicate what its future might be; for, as applied to locomotion, and as an auxiliary screw in our large merchant ships, there is a great point to be gained that is but partially attained by steam; one other value in the applications of such a power is as a species of division of labour, as when it will suit the requirements of the case instead of being combined into one large engine, as in the steam-engine, it may be applied as several smaller ones and thus the power be brought close to the work and not lost in the friction of transmission from a distance. It would be endless to point out the various conditions where such a power would be applicable; this is best left to the mind of each man, in his own particular sphere of mechanics, and doubtless each will, in his own way, see a useful application of such a power, when the management of the battery, &c., is reduced to that simplicity, that the man of the many can work and manage it as well as the man of the few.

Looking to the political economy of such a question as that of a new motive power, it is not surprising, notwithstanding the scepticism of empirical philosophers, that one should become an enthusiast in such a cause—feeling that the obstructions thrown in one's way are mere blocks of granitic ignorance to be hewn and removed aside by patience, perseverance, and investigation into the nature of things.

The new-born science, though still but little known, is gaining on us fast, and advancing with rapid strides into the business of every-day life.

In conclusion, it will be obvious how directly and immediately the application of this power could be traced to the physical principles before enunciated. It is one of the numerous instances in modern times in which physical philosophy has found an immediate practical result in the labours of investigation.

We must not, however, be too elevated with such achievements, for the triumphs of science should be ever regarded as manifestations of the working of a higher Providence, turning the development of new powers to the wants of mankind, and showing that as He has willed man's progress, so also He prepares the instrumentalities by which it is brought about.

STABILITY OF FLOATING BODIES.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Popular writers on hydrostatics very frequently betray a misconception of the law which governs stable and unstable equilibrium in floating bodies. In a work of considerable reputation I find the following:—

"Of all the various positions which can be given to a solid lighter than the fluid in which it floats, if there be one in which the centre of gravity will be *lower* than in any of the others, that one will be a state of *stable* equilibrium, and it will be one which the body will always endeavour to attain whatever other position may be given to it."

The incorrectness of this may be exemplified by the following simple experiments and the truth of the doctrine of *metacentre* as laid down originally by Bouguer, and subsequently by numerous writers, such as Chapman, Leslie, and Bland, may perhaps be confirmed if any of your mathematical contributors will bestow the requisite time. Mathematical analysis, based upon misconceived facts, can only invest a subject in a mist of error. Take three equilateral triangular prisms of exactly the same size: first, of cork; second, of dry pine; third, of dry ash. The first would be of about one-fourth of the specific gravity of water; the second, of about half of that specific gravity; and the third, of about three-fourths of it. It will be found by experiment that their only positions of stable equilibrium are those indicated by figs. 1, 2, and 3. Each, of course, displaces its weight of water, and each has a position of stable equilibrium different from either of the two others. Each prism can obviously

Fig. 1.

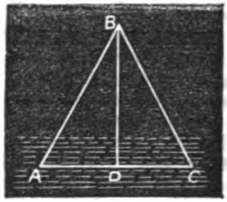


Fig. 2.

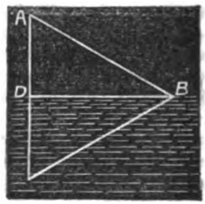
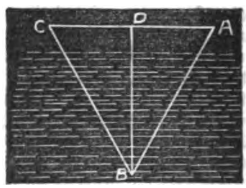


Fig. 3.



be placed in, at least, one other position of equilibrium, having the centre of buoyancy in the same vertical line as the centre of gravity, but such position would be unstable.

For instance, the cork prism may be placed with its angle, B, downwards as in

Fig. 4.

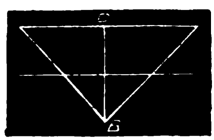


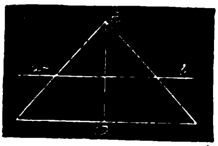
fig. 4, when the surface of the water would be equidistant from B and D, the immersed portion being one-fourth of the whole. Assuming the side of the triangle $= 1$, then

the line, B, D, would be $\sqrt{(1^2 - \cdot5^2)} = \cdot866$. The centre of gravity would be

$$\frac{\cdot866}{3} = \cdot2886$$

from D, and as the water is $\frac{\cdot866}{2} = \cdot433$ from D, the centre of gravity would be $\cdot433 - \cdot2886 = \cdot1444$ above the water. But if the prism, in this position, be acted upon by the least disturbing force it will forsake it, and assume the position of fig. 1, without resting in any intermediate position. But, in fig. 1, the water is at a distance from $B = \cdot866 \times \sqrt{\cdot75} = \cdot75$, and as the centre of gravity is at $\frac{2}{3} \times \cdot866 = \cdot5773$ from B, it must be ·1727 *above* the water. And being ·1444 above the water in the *unstable* position, it becomes, in assuming a stable position, ·0283 *higher*. This is contrary to the quoted theory. Fig. 3 is the above case of fig. 1 inverted. The immersion is three-fourths of the area. The water line is at ·75 from B, the centre of gravity at ·5773 from B. Therefore, at ·1727 under the surface of the water. Invert the position of the prism, as in fig. 5, then the water

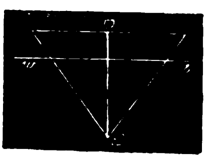
Fig. 5.



line is at ·433 from B, and the centre of gravity at ·1443 under it. In changing from this unstable position, it would consequently *descend* from ·1443 to ·1727 under the surface of the water.

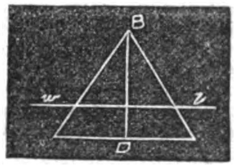
Fig. 2 has its centre of gravity *in the water line*. If placed, as in fig. 6, with

Fig. 6.



one-half of the area of the surface immersed, the water line would be at $\cdot866 \times \sqrt{\cdot5} = \cdot6123$ from B, the centre of gravity being at ·5773 from B, and, consequently, under the surface of the water, would have to *ascend* in changing from this unstable position to stable equilibrium; and if we put the prism in the position, fig. 7, with one-half of the area of the sur-

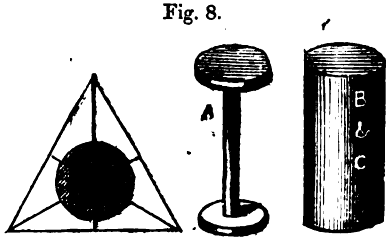
Fig. 7.



face immersed, the water line would be at ·6213 from B, and the centre of gravity being at ·5773 from B, would be above the water line, and have to *descend* in changing this position to stable equilibrium. In the cases thus adduced it is manifest that a floating body may *either lower or elevate* its centre of gravity in changing its position from unstable to stable equilibrium.

If a circular hole be bored through the pine prism, its centre being in the axis, or centre of gravity, of the prism, and of such a size as to take away rather more than half of the prism—that is, with a diameter

Fig. 8.



of ·54, if the side of the triangle equal 1 (the area of the triangle being ·4333 and $\cdot54^2 \times \cdot7854 = \cdot229$); then, by having three spindles, A, B, C,—A, a skeleton; B, of dry pine; and C, of box (fig. 8); when the hole is filled by A, the prism will float in the position of fig. 1; by B, in the position of fig. 2; and by C, in the position fig. 3. The centre of gravity being in the same situation in each case as if the prism were homogeneous, and the requisite change being produced by the difference in the specific gravity of the spindles.

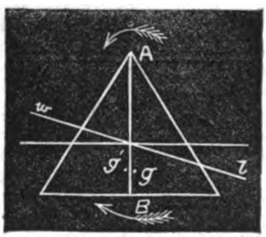
The principle of metacentre is a very obvious one. If a floating body be deflected by any extraneous force through a very minute angle without altering the amount of its displacement, the vertical line in which are the centres of gravity and buoyancy will be deflected with it—a new centre of buoyancy will be assumed, and if

a perpendicular be raised from it—then, if this perpendicular shall meet the original vertical line above the centre of gravity—the body has been deflected from *stable* equilibrium, and *vice versâ*.

Mr. Moseley, in his excellent treatise "On Mechanics applied to the Arts," has a very ingenious theory of stable and unstable equilibrium, at p. 245, which, although generally correct, is not absolutely so. He states—"The character of any position of equilibrium is determined by the direction of the motion of the centre of the centre of gravity (g) of the part immersed when the body is made to revolve out of that position. If the point, g, move towards the direction of the revolulution, the equilibrium is unstable; *if it move from it, it is stable!* the gravity of the body and the upward pressure of the fluid tending in the first case to continue the revolution, and the other to counteract and ultimately destroy it." This and the whole chapter of which it forms a part is extremely feasible, but it is not strictly true.

Take our pine prism, put it in the position here indicated (fig. 9), which we have

Fig. 9.



seen is an *unstable* one. Deflect it in the direction of the arrow, A, so that, w, l, becomes the water line; here the point, g, moves in the direction Mr. Moseley requires to evince *stable* equilibrium. The position, notwithstanding, is a position of *unstable* equilibrium.

My object in making the above remarks is not captiously to disparage the labours of men to whom we owe such an immense debt of gratitude for the instruction and amusement they have afforded us, but to induce some of your many scientific readers to devote a little of their time to the consideration and familiar elucidation of the subject.

I have not, at present, leisure to apply the principle above stated to the cases adduced, but I have never known it fail. Any one who feels sufficient interest in the matter may test it by them. I will just mention a simple formula which I have found to be useful, as, perhaps, some of your readers may not be acquainted with it. It is applicable to all prismatic bodies, or bodies having all their transverse sections the same as their bases and both sides of the vertical line alike. It is

$$\frac{\frac{2}{3}\,B^3}{D} = M$$

when B = half breadth at water line,
D = area of immersed portion of the end.
M = height of metacentre above centre of buoyancy.

Thus, taking one of the "saucers" to be used at the Victoria Dock: the dimensions are—400 feet long, 60 feet broad, and it is to draw 4 feet of water. Applying the formula, we have

$$\frac{\frac{2}{3}\,30^3}{4 \times 60} = 75 \text{ feet}$$

height of metacentre above the centre of buoyancy. As the centre of gravity of the "saucer," with a large ship upon it, will not be above 10 or 12 feet above the centre of buoyancy, the stability will be very considerable.

I am, Gentlemen,
Your obedient servant,
NAUTICUS.

COOPER'S PATENT SAFETY LAMPS.

MR. G. COOPER, of Sheffield, has patented an improved safety-lamp, in which he combines a modification of the "Argand burner" and the "Davy lamp." The base of the lamp contains an oil chamber surrounded by a concentric ring and air passage communicating with the centre. The air is drawn from within a wire gauze enclosing the lamp to afford a supply of oxygen to the interior of the flame. The wick is fixed in a tube of such diameter as may be found suitable, and can be regulated at pleasure by turning the body of the lamp. Combustion is promoted by a glass chimney which surrounds the flame, and communicates with a gauze division at the top, and thus prevents to a great extent the mixture of the vitiated gas resulting from combustion with the air required to support combustion. It also effectually prevents the gauze surrounding the light-yielding portion of the lamp from being clogged up or darkened by smoke, oil, or other impurities. Two additional thicknesses of gauze are introduced at the top to prevent all risk of the ignition of the gas

outside the lamp. The lamp can be locked so that the person using it cannot under any circumstances without the key have access to the light.

ON THE COMPASS WHIRLING ROUND IN THE BINNACLE.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Will any of your seafaring correspondents kindly say, if they have witnessed the appearance described above, or can throw light upon its cause?

In Sept. or Oct. 1802, being in a merchant brig on homeward voyage from Zante, in the neighbourhood of the island of Pantalaria, in the morning watch, broad daylight, sky clear and no clouds, light airs and variable, sea nearly smooth, the only other person in activity being the carpenter of the vessel, though it is presumable there were others within call, we were surprised by seeing the compass in the binnacle turn round and round at the rate (I should imagine) of twice every three seconds. It frightened *us*, though not so much as it would have done Columbus. We called the captain, but by the time he came on deck the motion had ceased.

The turning was what is called *with* the sun, or from north to east. Which implies that the divisions on the card, as they successively came up to the mark on the fore part of the box, succeeded in the order of those marked North, N. by W., &c.

Suspecting that a cabin-boy might have been playing some trick below, we tried in such ways as we could think of, to produce the same kind of motion by applying a piece of iron under the compass and moving it in a circle; but without effect.

Many years afterwards I saw the worthy mariner described, in his retreat in the Trinity House at Hull, and he recognized and confirmed the facts.

I am the more desirous to know whether similar instances have been observed, from a persuasion that among a number of naval men and others, to whom the circumstance was mentioned, some one said he had seen the same. The only solution which occurs at present is that the phænomenon was electric.

I am, Gentlemen,
Yours sincerely,
T. PERRONET THOMPSON.

Eliot-vale, Blackheath, March 31, 1858.

IRON SHIPS AND YELLOW METAL FASTENINGS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—There are objections to iron ships. The compass is not faithful. Their bottoms get foul. The captain of one, a fine ship, with beautiful fine lines, said that he could not "get six knots out of her" on her homeward passage from India. When used for ordinary mercantile purposes they frequently develope defects which would be calculated to damp the ardour of Mr. Grantham's enthusiasm on their behalf.

The system of wooden shipbuilding by layers of thin plank (having felt or some such substance between them), placed at right angles with each other, appears to possess all the advantages of iron ships without their disadvantages. The *Garland*, the *Banshee*, and many other steamers, as well as several sailing ships in the West India trade, prove the great advantage of this mode of construction. It has one obvious advantage over the old system of building by frames of a large scantling and one thickness of plank outside and inside, namely, that it depends for its strength (as far as fastenings are concerned) upon a multiplicity of small fastenings individually bearing so minute a portion of the strain to which the whole vessel may be subjected, as to render it impossible that they should be broken or become loose.

In the old system of building the fastenings are comparatively sparse and very large, and they, individually, sustain a great stress when a ship labours. If of iron, copper, or yellow metal they bend, break, or become loose in the softer material, which encases them; even Treenails, having their fibres exposed longitudinally to the "end grain" in the hole, become "necked."

My principal object, however, in writing to you is to call your attention to the yellow metal fastenings now so generally used in ships built upon the old principle.

The additional year given in classification by Lloyd's to ships entirely fastened with yellow metal, to the rejection of iron, has led to the general adoption of this fastening.

I send you a specimen of yellow metal bolt which has been so employed, and I think you will agree with me, that there is an objection to employing this material for ships' fastenings. There is nothing unique in this specimen; scarcely a ship is repaired the yellow-metal fastenings of which do not exhibit the same appearance.

The quality of the metal (you will ob-

serve) is completely changed for a considerable space within the periphery, forming a ring of partially decomposed matter, round a core of the metal in its original state.

Would it be worth your while to ascertain the nature of the chemical action which has produced the effect exhibited by the specimen?

I am, Gentlemen,
Your obedient servant,
NAUTICUS.

[The specimen forwarded by our correspondent unquestionably shows that the yellow metal fastenings undergo very deteriorating changes.—EDS. M. M.]

HIGHTON'S ELECTRIC TELEGRAPHIC APPARATUS.

THE small number of words at present capable of being sent through the Atlantic cable—the number being, according to the Company's Report, only four per minute—has induced Mr. E. Highton to devise a code system for use in long lengths of telegraphs. He lately exhibited, at the Institution of Civil Engineers, an instrument which was capable of transmitting through a wire eight hundred million times two million preconcerted messages, the maximum period for the occupation of the wire not exceeding ten or twelve seconds, if sent at the rate at which the Queen's Speech was transmitted from London. He also explained one of three instruments used in the transmission of the American President's last Message, which consisted of upwards of 16,000 words, at the rate of 3,500 words an hour. The desirableness of magnifying the effects of electricity arriving at a distant station, especially in the case of leaky wires, had led to the invention of an instrument for the purpose.

THE MILITARY USE OF RIFLE-SHELLS CONTAINING LIQUID FIRE MADE EASY.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—The model submitted to you represents the hollow screw-plug for closing the shell when the latter is nearly filled with the bisulphide of carbon. The plug contains small bits of phosphorus, its bottom being stopped with a close-fitting disc of sheet lead; thus, the component parts of the liquid fire are kept *separate*. When the shell is about to be used, an inner solid plug is screwed down with two or three turns, and thus presses the bits of phosphorus into the liquid, by which it is dissolved in about ten minutes, and is then perfectly ready for use. I owe the suggestion of this *safe* contrivance, though put in a different way, to Mr. Aclam, the intelligent assistant editor of the *Kentish Independent*.

I am, Gentlemen, yours, &c.,
J. NORTON.

Rosherville, March 29.

ON THE MOON'S ATMOSPHERE.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—"J. T." is unfortunate in his illustration, for nothing is more certain than that the bottom of "the sea" is not more dense than the top of it. The mistake is between density and pressure. And the same, or with very little difference, extends to "a mound of loose earth," and to "Mont Blanc."

In another part of your number for 27th March is the announcement from the *Moniteur*, that photographic experiments made in France during the eclipse of the sun on 15th March established the fact that the moon has an atmosphere of about twenty-five miles in height. Which must be understood to mean an atmosphere which to the height of twenty-five miles was dense enough to produce certain effects then and there observed.

Under these circumstances increased value is given to any attempt to determine *à priori* what the density may be expected to be.

I am, Gentlemen,
Yours very sincerely,
T. PERRONET THOMPSON.

P.S. May I take the opportunity to note, that in an article on "Sea-Serpents" in your No. before referred to, in the part which treats of the accidents of a man twelve feet high, "would bear" ought, for clearness, to have been "would have to bear;" and the name of the river where the serpent of Regulus was killed should have been "Bagradas."

Eliot Vale, Blackheath, March 29, 1858.

THE COMING ECLIPSE OF THE SUN.

AN eclipse of the sun will occur this year in the month of September; but it will only be central and total to the inhabitants on the southern part of our continent—America—where there are no observatories, we believe. Some of our scientific institutions should take measures to send out some of their *corps*, to make observations in Brazil and Peru.—*Scientific American.*

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Crocker, E. J. *Improvements in the rigging of ships and other vessels.* (A communication.) Dated June 25, 1857. (No. 1782.)

This consists in so connecting the reef tackles to the topsail yard, after leading such tackles from the reef band up and through blocks placed at or just below the cross trees, as to cause the topsail yard when lowered down to the reef band to support through the reef tackles all that part of the topsail which is below the reef band; the double topsail yards are dispensed with.

Palmer, W. *Improvements in watering pots, garden engines, and other apparatus for watering surfaces.* Dated June 25, 1857. (No. 1787.)

The chief object here is to water seeds, plants, garden-borders, &c., with a gentle shower of water or other liquid; and, when required, to confine the jets within a certain limit so as to prevent the wetting of garden walks, or other surfaces adjoining the part to be watered. Another object is to allow the use of liquid taken from manure pits, foul ponds, or cesspools, and to deliver the same free from obstructions into the rose or jet of the watering pot, without causing the holes to be stopped up.

Hancock, J. L. *Improvements in means or apparatus for washing or cleasing.* Dated June 25, 1857. (No. 1788.)

Here an endless band of linen is supported upon, and distended by, a pair of rollers enclosed in a close chamber, one of which rollers is immersed in wash liquor. To this band is affixed by loops or pins one end of the clothes to be washed, leaving the other end loose. When the rollers are set in motion, the band takes round the articles affixed to it, causing them to be alternately immersed in and carried through the wash liquids, and then withdrawn. A pressure roller acting with the upper of the supporting rollers causes the pressing out of the principal part of the waste liquor after each immersion.

Struve, W. P. *Improvements in miners' safety lamps.* Dated June 25, 1857. (No. 1789.)

Here the oil vessel is attached to a ring fixed to the bottom of a frame, consisting of bars, which come nearly together at their upper ends, and have a handle attached to them. The wire gauze is made into the form of a cone, the base of which is fixed to the oil vessel, or to the ring, so that the wick-tube, and consequently the flame, may be considerably above the bottom of the wire gauze. The upper end is closed by a cover of wire gauze. Around the burner is a glass chimney, supported by projections with turned up ends, through one of which a thumb-screw is passed, which retains the flanch formed at the bottom of the glass chimney.

Lloyd, J. *Improvements in utilizing and deodorizing sewage matters of dwelling houses and other places, and in apparatus to be used in connection with the same.* Dated June 26, 1857. (No. 1793.)

This consists in applying the waste of fire-places, alone or in combination with lime, to correct the nuisance produced by the sewage of houses, especially by human exertions, and thereby reduce them to a harmless state, so as to be easily removable with such refuse, and so to be used as manure. The patentee proposes to use inside of closets, and beneath the seats, metallic or other pans of sizes convenient to be introduced, and removed therefrom, and through passages, &c., when full.

Hattersley, R. *Improvements in machinery for distributing and setting up or composing type.* Dated June 26, 1857. (No. 1794.)

This consists—1st. In arrangements of machinery whereby the types are selected and deposited in the compositor's stick. 2. In improvements in the construction of compositor's sticks. 3. In machinery for changing the position of the compositors' stick after each row of type has been set up; and lastly, in making compositor's sticks of sufficient length that the type set up therein may be divided into two or more lines of printing. The object is to diminish manual labour in distributing and setting up or composing type.

Parsons, W. *Improvements in fittings to door handles and spindles.* Dated June 26, 1857. (No. 1796.)

This consists in certain improved fittings to the handles and spindles, whereby they may be readily adjusted to suit the thickness of the door to which they are to be fitted, are securely fixed, and admit of ready removal when requisite.

Nicholls, B., and S. Ledward. *Improvements in mules for spinning.* Dated June 26, 1857. (No. 1797.)

This refers to hand mules, and relates to lifting the weighted lever that acts to bring the mechanism into gear for taking out the carriage. It consists in arrangements for lifting the weighted lever so as to extend the time of lifting over a larger part of the stretch or going out of the carriage than is taken by the ordinary method, the mechanism being actuated by the "Mendoza" or "taking out shaft."

CROOK, W., G. RUSHTON, and J. CROWTHER. *Improvements in looms.* Dated June 26, 1857. (No. 1798.)

This consists in improvements upon several previous patents granted to the said W. Crook and others, and relates, 1st, to the sun and planet or star motion frequently applied to looms working two or more shuttles. The patentees add a compound meter or measuring motion to the planet or star wheel to obtain greater latitude and power in diminishing the speed and regulating the number of picks required for varying the pattern, the said meter wheels consisting of notched drums, one on the planet or star wheel stud, and another on a shaft extending across the back of the loom. 2. In the employment of a clutch to each tappet. 3. To an improved stop and taking-up motion. 4. To an arrangement of the treddles, which they place outside the framing of the loom, having motion imparted to them by means of tappets also placed outside the framing, in conjunction with a pinion and racks.

GAUDRION, S. *An improvement in screw propellers.* (A communication.) Dated June 26, 1857. (No. 1802.)

This is intended to prevent molecules of water struck by the screw from rolling on to its surface when the water yields to the centrifugal force, and from producing injurious eddies, by means of a "grooved screw."

THURBER, C. *An improved kaligraph or writing machine for writing and similar purposes.* Dated June 27, 1857. (No. 1805.)

This invention cannot be described without engravings.

HOWLAND, R. *Improvements in the construction of mangles.* Dated June 27, 1857. (No. 1807.)

This applies to "box mangles," and is intended to make them run more steadily with less power, and more adapted to be driven by steam power. It also refers to the method of lifting the mangle box.

OLIVIER, A. A. *Improvements in treating or preparing and winding silk from the cocoon, and in apparatus for the same.* Dated June 27, 1857. (No. 1809.)

The bases of this invention are—1st, Division of labour. 2. The use of mechanical means instead of the woman's hand in the most delicate operations of spinning. The machinery cannot be described without engravings.

SWINDELLS, G., and J. ARNOLD. *Certain improvements in spinning and doubling yarns, and in machinery or apparatus of the kind commonly known as mules and twining jennies.* Dated June 27, 1857. (No. 1810.)

This consists in causing the carriage of the mule or jenny to be taken out with a gradually accelerated speed, so that the gain of the carriage may be small at the commencement of the draw, and be augmented by larger and larger increments as the distance of the spindles from the rollers increases. It also consists in an improvement in the construction of the headstock for the purpose of varying or regulating the speed of the carriage.

CARTER, J., and B. HODGSON. *Improvements in weaving carpets and other fabrics.* Dated June 27, 1857. (No. 1811.)

Here in place of the wires used when weaving carpets, &c., being introduced and withdrawn by mechanism actuated by the power which works the loom, the wires are introduced and withdrawn by power independent of the first mover of the loom by means of the direct action of the piston rods of pistons which are actuated by steam, water, air, or other fluid. The picking motions of looms are derived in the same manner. It also consists in the employment of a peculiar combination of mechanism in power looms for governing the give-off motions of the warps therein.

NEWTON, W. E. *Improved machinery for grinding the teeth of card cylinders.* (A communication.) Dated June 27, 1857. (No. 1812.)

This consists in combining a double, or right and left handed screw, to produce the traverse motion of the grinding wheel with the said grinding wheel and its shaft.

LAURENT, N. *Improvements in the process of dressing and manufacturing shammy leather.* Dated June 29, 1857. (No. 1814.)

This consists in preparing and dressing the skins of animals, so as to give them the appearance of fine woollen cloth, and even of velvet.

NYE, S. *Improvements in mills for grinding coffee, pepper, spices, and other substances.* Dated June 29, 1857. (No. 1815.)

This consists of a cone, the interior surface of which is serrated, and of another cone having its exterior surface serrated, which is made to revolve in the first cone by a winch. The patentee forms a stand which is provided with a cramp and thumb screw, by which it is readily fixed to and removed from a table or any other convenient place. In the centre of the stand is a screw, by means of which the mill is regulated.

PATTISON, J. *An improved rotatory pump.* Dated June 29, 1857. (No. 1817.)

This invention cannot be described without engravings.

LAWRENCE, J. *Improvements in appa-*

ratus for brewing. Dated June 29, 1857. (No. 1818.)

This consists in constructing the bottom or false bottom of the mash tun or vessel of wire gauze or closely perforated plates, used in combination with gratings or framings, and either fixed to them or otherwise, or of narrow bars so laid together, or side by side, as to leave narrow longitudinal spaces or openings between, by which means a more perfect extract is obtained than by bottoms with fewer holes. It also consists of a separator or floating strainer to be placed at or upon the surface of the beer during the process of fermentation, and so formed in one or more pieces, and with holes, to allow the yeast (as it accumulates) to rise through the said holes and to settle upon the upper surface of the separator or strainer, and at the same time allow any beer which may rise with the yeast to separate and run back through the said holes, and the yeast is simply removed in a dry state from the top of the separator or strainer, taking up very little, if any, of the beer or agitating its surface.

MEAKIN, J. F. *Improvements in carriages for children, commonly called perambulators, and applicable to carriages for invalids.* Dated June 29, 1857. (No. 1819.)

This invention comprises a break apparatus which is applied to the front of the wheel when the handle of the perambulator is let go, and is removed from the wheel when the handle is pushed upon; also a hood for screening the child; and a stuffed cheek to prevent its head falling too much on one side when the child is asleep.

GILBEE, H. *Improvements in machinery for moulding vermicelli and other paste.* (A communication.) Dated June 29, 1857. (No. 1820.)

This relates to a machine in which the vermicelli, macaroni, &c., is passed through a suitable mould by means of a revolving cylinder in combination with slides or pressers to give them a cylindrical or other form.

FIELD, J. L., and C. HUMFREY, jun. *Improvements in the manufacture of candles.* Dated June 29, 1857. (No. 1821.)

The moulds in which the candles are to be cast are made with cups and detached; but instead of making the barrels conical, the patentees have their moulds constructed with cylindrical barrels. The candles are to be cast according to the process patented 22d Feb., 1856, by J. L. Field and C. Humfrey, No. 454, and when cold the moulds are exposed to free steam, and the candles suddenly withdrawn. They next take one or more steel draw-plates or cutters with apertures diminishing in size, and fixing them on a frame with guides for the candle to slide in, force the candles through the cutters. By such means the rough surface is planed off, and the candle becomes smooth, polished, and transparent.

BUCHHOLZ, G. A. *Improved machinery for hulling and cleaning rice, wheat, and other grain.* Dated June 29, 1857. (No. 1822.)

This relates chiefly to the construction of stones to be used in the hulling, &c., of rice and other grain. The stone is either cylindrical or conical, and mounted vertically in a case of corresponding form, and made, by preference, of pierced metal. On the periphery of the stone the patentee forms annular grooves of different depths, to obtain as much acting surface as possible on the periphery of the stone. The grain is fed into the case at or near the top, and a space being left between the case and the periphery of the stone, the grain passes down and enters the aforesaid annular grooves, where the grains are usually polished on two or more sides simultaneously. The down pressure of the continued supply of grain, aided by the centrifugal action of the stone, causes the grain to pass out of one groove into that next below it, and so on in succession until it arrives at the discharge opening in the bottom of the case.

PITMAN, J. T. *An improved method of making carburetted hydrogen gas.* (A communication.) Dated June 30, 1857. (No. 1824.)

This consists in the use of fused metals in connexion with a suitable retort, so constructed as to pass carbono-hydrone vapours or substances beneath or in immediate connexion with the surface of such fused metal.

HARDCASTLE, T. *A machine for doubling, winding, plaiting, and measuring cotton and other fabrics.* Dated June 30, 1857. (No. 1825.)

This invention cannot be described without engravings.

CLÖET, I. C. *An improved rice and barley mill.* Dated June 30, 1857. (No. 1826.)

This consists in enclosing, within a case, a circular stone mounted so as to revolve in opposite directions, and admit of the rice, &c., being carried round and worked between them, the said rice, &c., during the rotatory action of the apparatus being uniformly fed and discharged, without personal attendance, by means of valves, in connexion with tooth and pinion gearing, whereby the valves are actuated and regulated during the operation of the apparatus.

PARSONS, W. *Improvements in fastenings for windows and casements, and for other similar purposes.* Dated June 30, 1857. (No. 1827.)

This invention cannot be described without engravings.

ALSOP, J., and E. FAIRBURN. *Improvements in machinery for the manufacture of bread, biscuits, and cakes.* Dated June 30, 1857. (No. 1828.)

The patentees claim, 1st, the application of friction rollers to the two metallic baking cylinders, which rollers support the bread, and carry it forward after it is baked to the cutting rollers. 2. The use of circular cutting rollers, for the purpose of cutting the bread into proper sizes after it has been passed from the baking cylinders. 3. The application of a drying stove, which contains two endless webs of wire gauze or other material called creepers, which being set in motion, the bread is carried between these two creepers or webs to the other end of the drying stove, where it may then be taken out.

SPOTTISWOODE, A. *Improvements in machinery for compressing artificial fuel and other substances.* Dated June 30, 1857. (No. 1829.)

In a revolving frame are formed the requisite number of moulds without top or bottom. This frame revolves upon a fixed table, round which at equidistant points are placed, a feeder, by which the moulds are filled; a lever or direct acting mechanical press; an hydraulic press; and a discharger or plunger for emptying the moulds. To facilitate the operation of pressure as well as to increase the solidity of the blocks he makes use of exhausters acting both under the feeder, and in the presses simultaneously with the pressure which draws the gas from the moulds. When the pressure is from below the exhaustion is produced above. The gas extracted is discharged into the fire and assists in the production of heat. Other features are included.

POLE, W. *Improved means for supporting telegraph wires.* (A communication.) Dated June 30, 1857. (No. 1830.)

This relates to the construction of metallic supports composed of two or more bars or tubes of iron. Two, three, or more bars or tubes may be used to make one support. The inventor prefers employing three bars or tubes in the form of a tripod.

NICKLESS, J. *A new or improved railway chair.* Dated July 1, 1857. (No. 1831.)

This chair consists of two cheeks between which the rail is held, one of the cheeks being fixed to the bed-plate of the chair, and the other cheek sliding upon the bed-plate, the moveable cheek being made to press the rail against the fixed cheek by a wrought-iron wedge driven horizontally between the moveable cheek and an upright or uprights on the bed-plate of the chair.

BREWER, T. *Improvements in machines for cutting and reducing turnips or other vegetable substances.* Dated July 1, 1857. (No. 1832.)

These refer to the disc turnip cutter, and consist in so constructing the disc that it will first slice the root, and then by means of stucks, or other projections, carry the pieces through a series of teeth, arranged in fixed shields or guards, which are so placed with respect to the revolving disc as to act as a receptacle for, and to retain, the cut slices until the projections in the revolving disc come round and carry the slices through the teeth in the shields or guards.

LEFFLER, C. J. L. *Improved machinery for cutting corks, bungs, and other similar articles.* Dated July 1, 1857. (No. 1834.)

This relates principally to the use of a knife of peculiar construction for cutting these articles from blocks of cork. The knife is made of a long blade of thin steel with an inclined cutting edge. This blade is turned up longitudinally into the form of a cylinder of the dimensions internally of the cork required. The knife is held in a fixed position, while the block of cork is propelled forward against the cutting edge, which, as the block advances, will cut off the corners, leaving a cylindrical block which is discharged from the inside of the knife at the opposite end.

NEWTON, W. E. *Improved processes for ornamenting metallic surfaces, and for producing surfaces in intaglio, or in relief for printing purposes.* (A communication.) Dated July 1, 1857. (No. 1835.)

The patentee claims, 1st, the combination of the process of galvanoplasty, or the electro deposit or reduction of metals, with the art of photography, for obtaining engraved plates in intaglio or in relief, for printing therefrom, or for obtaining ornamental designs or surfaces. 2. Effecting by means of electricity direct metal deposits upon photographic images obtained by means of a metallic salt.

OLOFSON, E. B. *Improvements in the manufacture of pigments or colours for preserving iron.* Dated July 2, 1857. (No. 1839.)

This composition is a mixture of graphite (otherwise plumbago or black lead) and linseed oil, to which is added powdered white marble, or calx, and sometimes a small quantity of sulphur.

MALARD, A. P. *Certain improvements*

in filtering water and other liquids. Dated July 2, 1857. (No. 1840.)

The filtering material consists of wool shearings obtained from shearing cloth, &c., and is afterwards submitted to certain baths to give to the wool a more or less black colour, and the property of remaining a long time in water without becoming decomposed. The wool is placed in layers in a closed or open vessel fitted with perforated false bottoms.

LAURENT, M. A. *A new antiseptic composition.* Dated July 2, 1857. (No. 1841.)

This consists in the employment of certain substances combined in certain proportions, for the preparation of an antiseptic composition, which is applied to paper, and in the form of pastilles or otherwise, the object of which is to neutralise miasma and putrid odours, thus replacing the use of chlorine, in certain cases serving to purify the clothes and apartments of the sick or dead, and to prevent contagion.

MOY, T. *Improvements in the mode of working steam-engines.* Dated July 2, 1857. (No. 1842.)

This consists in working the pistons of steam-engines by means of steam generated on its admission into the cylinder, instead of being supplied by a steam pipe from the boiler.

ORPHIN, C., and E. LYONS. *Certain improvements in table and other lamps.* Dated July 2, 1857. (No. 1845.)

These consist in so constructing the burners of lamps that the patentees are enabled to burn, without smoke or smell, the oleaginous fluids or combinations of oil and spirits that may be extracted from decomposed vegetable, bituminous, or other strongly impregnated carbonaceous matter.

DAVIES, G. *An improved marine steam-engine governor.* (A communication.) Dated July 2, 1857. (No. 1846.)

The object here is to cause the rising or sinking of the stern of the vessel in the water, above or below the ordinary level, to act upon the throttle valve, so as to keep the action of the steam-engine uniform at all times.

BROWNE, T. *An instrument for ascertaining the true or actual acclivity and declivity of bodies.* Dated July 2, 1857. (No. 1848.)

This consists of two pieces of wood hinged together at one end. One of such pieces has a spirit level fixed thereto at the top side thereof, and the other has a folding piece connected thereto, upon which are marked degrees of inclination, or angles of space, and constitutes, in fact, a folding sector, which, when the instrument is in use, passes through the before-mentioned upper part of the instrument containing the spirit level.

ROWAN, W. *Improvements in scutching and heckling flax and other similar fibres, and in machinery employed therein.* Dated July 2, 1857. (No. 1849.)

This invention is described and illustrated at page 313 of this number.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

LOACH, J. *A metallic air-tight coffin.* Dated June 25, 1857. (No. 1780.)

This simply consists in the application to the whole or partial manufacture of coffins of zinc, the bodies of the same being cast in one piece, and the lid soldered on, thus rendering them air-tight.

INGHAM, J., E., and B. INGHAM. *Improvements in preparing worsted yarns for dyeing.* Dated June 25, 1857. (No. 1783.)

The inventors place the hanks of yarn upon a stretching frame, and submit them to the action of boiling water or steam whilst in that distended state, by which means all tendency to twist, curl, cockle, shrink, or blister is prevented.

ARTHINGTON, J., and H. SMITH. *Improvements for the better illumination of the Davy lamp.* Dated June 25, 1857. (No. 1784.)

This consists in the use of naphtha or mineral spirit in the Davy lamp.

PELEZ, A. *A new composition for the manufacture of imitative stones.* (A communication.) Dated June 25, 1857. (No. 1785.)

The inventor puts into a cauldron placed over a furnace—1st, 10lb. resin; 2d, 20lb. fine plaster of Paris; 3d, 4lb. vitrified coal; 4th, 10lb. fine dry sand. Begin with the resin, and when it has become liquid from the effect of the heat, and its volatile essence has evaporated, throw into it through a sieve the plaster of Paris, and continually stir up the mixture. The resin absorbs the plaster, and, combining with it, forms a species of leather, which is the strata of the composition. The composition is poured into moulds while in a liquid state, and when solidified is taken from the moulds, and any desired device is thus produced, according to the form of moulds employed.

GREEN, J. *Certain improvements applicable to bedsteads and other articles of furniture, for the purpose of excluding therefrom bugs or other similar insects.* Dated June 25, 1857. (No. 1786.)

This consists of a small prop or foot

attached to the article of furniture by a screw. This prop fits into a socket in the centre of the bottom of a cup-shaped vessel, which is placed on the floor. This vessel is partially filled with water. It will be evident that the props are perfectly insulated, and no insect can reach them from the floor without passing over or through the water. Upon the top of the bedstead, &c., is placed a cover of wood, &c., having no interstices through which insects might creep, and provided all round the outer edge with a small trough of tin, also containing water, so that if any insect should drop from the ceiling of the room on to the top of the bedstead, &c., it cannot pass to the interior thereof without passing through the water.

BOUGH, W. *Improvements in lamps for burning resin and other oils and fluids, also an improvement in argand gas-burners.* Dated June 25, 1857. (No. 1790.)

These improvements cannot be clearly described without engravings.

BOURNE, S. *An improvement in the manufacture of felted fabrics.* Dated June 25, 1857. (No. 1791.)

This consists in combining silk cotton with wool, fur, &c., and causing the same to be felted into fabrics for making hats, &c.

GLOVER, H. *An improvement in pump-buckets.* Dated June 25, 1857. (No. 1792.)

This invention was described and illustrated at p. 61, of No. 1771, Vol. 67.

WATKINS, F. *Improvements in the manufacture of screw-nuts.* (A communication.) Dated June 26, 1857. (No. 1799.)

Here the end of the metal bar is first shaped immediately in front of the mouth of the die box, so as to correspond on all sides but one with the construction of the finishing die box, by which the necessity of cutting off by the punch of more than one side of the nut to be formed is prevented, by which there is a saving in metal, also in the power required.

MICHAELIS, M., and J. CLEMSON. *Improvements in the production of ornamental textile fabrics by printing.* Dated June 26, 1857. (No. 1800.)

These relate to silk velvets which, for the purposes of the invention, are woven without being dyed, constituting a fabric known as the "grey" state. Upon this fabric the inventors print by the usual methods; but, if desired, the ordinary method of dying a portion of the threads may be combined therewith. Under the term "silk velvets" they intend to include those fabrics which are imitations thereof, as the same may be woven with cotton or other backs, or with a mixture of materials.

HEYWOOD, B. J. *Improvements in the manufacture of india-rubber goods.* Dated June 26, 1857. (No. 1801.)

The inventor combines in their green state vulcanised india-rubber compounds prepared so as to retain respectively, when cured by the application of heat, permanen elasticity and rigidity, and thus produce a flexible or semi-flexible material that will not be likely to collapse when made up into hollow articles, such as hose for fire-engines, trunks, cases, boats, &c.

PRESTON, J. *Improvements in apparatus for regulating the pressure of steam and other fluids.* Dated June 27, 1857. (No. 1803.)

This consists in causing the steam, &c., to pass through two valves fixed to the same spindle, which is connected to a hollow lever mounted on a hollow axle. This lever contains mercury at one end, and a tube within the lever dips into the mercury, on which the steam, &c., after passing through the valves, acts. When the pressure on the fluid increases, the mercury is forced into the tube within the lever, and passes through the other extremity thereof, thereby exerting sufficient power to partially close the valves. The fluid is thus caused to pass through more contracted orifices, and the pressure thereof is reduced. When the pressure is reduced the mercury runs down the tube in the lever, thereby increasing the opening of the valve.

POLLARD, J. *Improvements in machinery or apparatus for distributing manure.* Dated June 27, 1857. (No. 1804.)

The manure is placed in a box of a hopper form, which is supported upon a frame with wheels. At the opening in the bottom of the box is a roller of bright metal, and this roller has a series of ridges along its surface for taking the manure and throwing it out as the cylinder revolves. Rotary motion is given to this cylinder from one of the carrying wheels. There is a brush formed of whalebone acting along the surface of the cylinder, and which brush is capable of adjustment. A stirrer is placed inside the box to keep the composition in motion. There are scrapers applied to act on the cylinder and keep it clean. There is a spout to conduct the manure as allowed to fall correctly to the earth, and prevent the wind from scattering it. In this spout are applied rods or grates to assist in scattering the manure.

GREEN, J., and W. COPPIN, jun. *The preservation of timber.* Dated June 27, 1857. (No. 1806.)

The timber is first placed on an oven, and covered with chalk, loam, &c., to prevent it from being burnt, then dried and heated,

and the sap reduced to a glutinous state. It is next passed into a tank containing a preservative liquid, which fills the pores of the wood. The preservative liquids which the inventors propose to use are (for railway sleepers and other timber not designed for painting) coal, tar, oil, and for other purposes. In preparing timber to be used in building piers, vessels, &c., it is proposed to add sulphur, arsenic, or other poisonous material to the liquid in the tank, which would prevent worms, &c., from perforating the timber.

Liger, P. E. *Improvements in grinding mills.* Dated June 27, 1857. (No. 1808.)

This refers to so supporting and adjusting the running stone of such mills, that it may be readily and correctly adjusted in equilibrium, and that it will maintain its equilibrium during the working of the stone, whereby the grinding action is rendered more equable, and the minimum of power only required to drive the stone.

Biggs, J. *A portable folding perambulator, which is so constructed as to occupy less space than any that has hitherto been invented.* Dated June 27, 1857. (No. 1813.)

The back of this perambulator falls down upon the seat. The sides fall conjointly with the back, working on a pivot, thereby economising space. The handles drop into a tube, and are removeable, being secured by thumb screws. The two hind wheels can be taken off without removing the caps or linch pins, and are fixed to the axle with a cylinder or screw. The front wheel and irons are secured with a spring having a handle to remove it at pleasure. The wheels and front irons pack in the body of the carriage, the whole forming a packing case of ten inches high, fifteen inches wide, and twenty inches long.

Maltby, W. *Improvements in the mode of extracting ammonia and other compounds from gas, gas liquor, sewerage, and other substances.* Dated June 29, 1857. (No. 1823.)

In extracting ammonia from gas, the inventor causes the latter to flow through a vessel containing oil, to cause the ammonia to leave the gas and enter into combination with the oil, forming a new compound; by treating this oily compound with hydrochloric, sulphuric, or other acids, the oil is set free, and a salt of ammonia is formed. In applying this process to the purification of gas made from the distillation of coal, he adopts the above described method when ammonia alone is to be eliminated; but when carbonic acid, sulphuret of carbon, and the other impurities contained, have also to be removed, he can effect this in one operation by mixing the oil with lime, and a metallic salt or oxide such as is generally employed, and after allowing the gas to pass through the mixture, to treat the oily compound of ammonia with an acid, as before described. There are other processes included in this invention.

Prince, A. *Improvements in the construction of irons used by tailors and others for pressing cloth and other materials.* (A communication.) Dated July 1, 1857. (No. 1833.)

This consists in using gas for the above purpose, by which means an uniform amount of heat may be maintained and regulated.

Murray, G. *Improvements in machinery or apparatus for propelling ships and vessels.* Dated July 1, 1857. (No. 1836.)

This relates to propelling ships by the agency of the reactive force arising from the effluence of streams of water at the stern of the vessel.

Danchell, F. L. H., and H. Kimber. *Improvements in the manufacture of fire and waterproof bricks, plates, crucibles, and other vessels, forms for castings, and similar articles.* Dated July 2, 1857. (No. 1837.)

These consist in applying carbonized substances, such as coke, vegetable or animal charcoal, boghead ash, graphite, soot, or lamp black with bituminous matter, such as resin, pitch, tar, asphalt, wax, or oil, and to compress the same by pressure in a warm and dry state into forms adapted for the objects to be manufactured. The articles are then baked in ovens such as commonly made use of by potters.

Smith, A. *Improvements in the construction of life-boats and other boats or vessels.* Dated July 2, 1857. (No. 1838.)

This consists in constructing the shell or body of the boat, or like vessel, of wire gauze moulded to the required form. Boats thus constructed may be covered with leather, gutta-percha, or other waterproof materials.

McCraw, W. *Improvements in the production of photographic pictures.* Dated July 2, 1857. (No. 1843.)

This relates to producing positive photographic images or pictures on white, or light tinted substances, either vitreous, animal, or vegetable.

Bellhouse, E. T., and W. J. Dorning. *Improvements in steam boilers.* Dated July 2, 1857. (No. 1844.)

Here the internal flue or flues of a cylindrical or other shaped steam boiler are corrugated on the upper side. Across these flues, at suitable distances, are fitted vertical and slightly inclined water ways, which

open into the body of the boiler at each side of the flue or flues, so that a constant circulation of water may be effected through them; and, as these water ways are heated by the direct action of the flames, the generation of steam therein will be considerably increased.

CUTLER, G. *Improvements in mangles.* Dated July 2, 1857. (No. 1847.)

Here four rollers are used, one being above and three below. The pressure is given by the upper roller (which is mounted in weighted levers) and is received by the centre one of the three lower rollers, the other two lower rollers acting principally as guides. A cloth is attached by one end to the centre bottom roller. The mangle is provided with a table made to fold down upon hinges when not in use. The mangle is turned by means of a winch handle attached to the axle of the bed roller.

PROVISIONAL PROTECTIONS.

Dated February 11, 1858.

259. Charles Johnson, of Dickleborough, Norfolk, and George Johnson, of Wandsworth. Improved machinery or apparatus for performing different operations required in agriculture.

Dated February 25, 1858.

378. Samuel Middleton, of Little New-street, Fetter-lane, cordwainer. Improvements in the uniting or seaming articles of leather, and in the apparatus connected therewith.

Dated February 27, 1858.

390. David Nurse, Robert Nurse, and George Nurse, of Machan, Monmouth, tin-plate manufacturers. Improvements in coating metals and in the apparatus connected therewith.

Dated March 4, 1858.

433. Samuel Boulton, of Everton, near Liverpool, agent. Obtaining by an improved method certain products from materials used in the manufacture or purification of gas.

Dated March 5, 1858.

444. Jonathan Nash Hearder, of Plymouth, philosophical apparatus maker. Improvements in submarine telegraph cables.

Dated March 6, 1858.

448. George Davies, of Serle-street, Lincoln's-inn. A substitute for red lead, either as a cement for joints or a coating for preserving metals. A communication from Messrs. Bouchard and Clavel, of Paris.

450. Robert Smith Bartleet, of Redditch, Worcester, needle-manufacturer. An improvement or improvements in papers, envelopes, or cases for holding needles.

452. Comte Camille Cavalli de St. Germain, of Piedmont, ex-officier d'Artillerie Sarde. Improvements in the manufacture of starch.

454. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., Editor of the *Mechanics' Magazine* and Patent Agent. An improvement in the construction of skirts and petticoats. A communication from Auguste Defraire.

456. Andrew Whytock, of Little St. Andrew-street, Upper St. Martin's-lane. Improvements in apparatus to be applied to wheels to facilitate them in travelling on common roads and other surfaces.

458. John William Clare, of Surrey-square, civil engineer. Improvements in apparatus for stopping or retarding railway engines, carriages, and trains, and communicating signals between parts of a train.

462. Charles Sanderson, of Sheffield, merchant. Improvements in the manufacture of malleable iron and steel.

464. Jacques Henri Marie Maissiat, of Paris, chemist. Improvements in dibbling machinery for depositing grain and manure.

Dated March 8, 1858.

468. John Henry Johnson, of Lincoln's-inn-fields. Improvements in the decoration or ornamentation of leather, cloth, and similar fabrics, and the application of the same to various useful purposes. A communication from Auguste Pellet, of Paris.

470. Henry Doulton, of Lambeth. Improvements in the manufacture of smoke and air flues.

472. William Clark, of Chancery-lane. Improvements in gas meters. A communication.

Dated March 9, 1858.

474. John Edgar Poynter, of Glasgow, manufacturing chemist. An improved illuminating oil.

480. George Tosco Peppé, of Britannia-terrace, City-road, engineer, and Louis Goodman, of Oxford-street, linen draper. Improvements in the construction and arrangement of time-keepers.

Dated March 10, 1858.

482. Hypolite Dauphin, of Nantes, France, jeweller. A new or improved machine for giving to metallic bands a circular or partly circular form.

484. William Harding, of Park-villas, Forest-hill. Improvements in breech-loading fire arms.

Dated March 12, 1858.

497. James Worrall, of Salford, dyer, and Charles Race, of Manchester, manager. Improvements in machinery or apparatus for stretching and drying fabrics, part or parts of which said apparatus are also applicable to other machines wherein fabrics are required to be distended.

499. James Warburton, of Addingham, near Otley. Improvements in carding engines. Partly a communication.

501. Thomas Tertius Chellingworth, of Birmingham, civil engineer. Improvements in suspending chandeliers and gas pendants.

503. Adolphus Ash, of Woolwich, cabinet maker. An improved pocket or other like safety clasp or protector.

505. James Wright, of Alfred-place, Newington-causeway, civil engineer. Improvements in the mode of treating tanned and untanned hides and leather. A communication.

507. Luigi Ferrari Corbelli, of Florence, Tuscany, Commander of the Order of Malta. An improved process for extracting aluminium from its compounds, and obtaining at the same time protochloride of mercury. Partly a communication from Vincent Riatti, of Modena.

Dated March 13, 1858.

509. George Carter, gentleman, of Mottingham, Kent. Improvements in steam engines and machinery for propelling vessels and other bodies in water, and other purposes.

511. Spencer Thomas Parmelee, of Edinburgh. A new mode of combining certain materials to be used in the manufacture of boots and shoes.

513. Samuel Walker, of Birmingham, manufacturer. Improvements in the manufacture of tubes of copper and alloys of copper.

515. William Riddle, of Stonefield-terrace, Liver-

pool-road. Improvements in the manufacture of wrought iron nails.

517. Stephen Thomas Osmond, of Ramsbury, Wilts, and Edwin Dandridge Collins, of Newbury, Berks, machinists and ironfounders. Improvements in ploughs.

Dated March 15, 1858.

519. Julien Desiré Briet, of Paris, merchant. Improvements in pipes for smoking.

521. John Gough, of Chester, agricultural machine maker. Improvements in horse-gear for driving machinery.

523. Louis Joseph Tellier, of Pithiviers, France, tinker. Improved machinery for raising water and other liquids.

525. Amand Ferry, of Great Marlborough-street. Improvements in cornets and other wind musical instruments. A communication.

527. John Scott Russell, of Great George-street, Westminster. Improvements in preserving the bottoms of iron ships and vessels.

529. Arthur Wallis and Charles Haslam, of Basingstoke, Hampshire, agricultural implement manufacturers. Improvements in engine, machine, and other like bearings.

531. Edmond Armand Louis D'Argy, of Batignolles, near Paris, manufacturer. A new or improved rotary hydraulic blowing engine.

Dated March 16, 1858.

533. George Hall, of Worcester, ironmonger. Certain improvements in cartridges and gun wads.

535. William Thomas Eley, of Broad-street, Golden-square. Improvements in cartridges.

537. Philip Le Capelain, of Blackfriars-road, gas engineer. Improvements in dry gas meters.

PATENT APPLIED FOR WITH COMPLETE SPECIFICATION.

577. Daniel Harris, of Massachusetts, United States. A new and useful or improved sewing machine. Dated March 20, 1858.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," March* 30, 1858.)

2872. C. Debax-Talabas. Improvements in lithographic printing presses.

2888. W. H. Bell. Improvements in the permanent way of railways.

2894. R. Clegg. Improvements in registering or indicating apparatus, applicable to the registration or indication of fares, the distances passed over by vehicles, the revolutions of machines or parts of machines, and other similar purposes.

2895. M. Booth and J. Farmer. Improvements in machinery or apparatus for stiffening, drying, and finishing cotton, linen, woollen, and other woven fabrics.

2910. J. E. B. Curtis. Improvements in apparatus for filing papers and documents.

2913. W. J. Cantelo. Improvements in the preparation and application of graves or cracklings for the purposes of animal food and manure.

2922. W. A. Cooper. Improvements in the navigation of steam and other vessels.

2925. G. J. Benson. An improvement in the manufacture of moulded sugar.

2940. C. Sands. Improvements in stereoscopes.

2944. F. H. Maberly. An improved general polishing machine or apparatus.

2950. W. Blinkhorn. Certain improvements in machinery or apparatus for grinding and smoothing, and for polishing glass.

2953. H. Woodward. A new or improved knife cleaner.

2954. J. Ruston and J. T. Proctor. An improved arrangement of machinery for dressing grain.

2955. J. Higham and G. D. Bellamy. An improvement in the manufacture of soap.

2970. J. Nichols. Improvements in machinery or apparatus used for sizing yarns or threads.

2975. R. A. Brooman. Improvements in casks and other vessels for containing liquids. A communication.

3017. M. A. F. Mennons. Improvements in lucifer matches. A communication.

3021. J. Brinton and J. Crabtree. Improvements in the preparation of weft yarn, to be used in the manufacture of carpets and other pile fabrics.

3040. W. Rowan. Improvements in spinning flax and other fibrous material, in preparing the same for weaving, and in the machinery employed therein.

3049. J. Hoddell. An improvement in watches.

3071. J. P. Brignon. Certain improvements in forging.

3114. R. Oxland. Improvements in the manufacture of alloys or compounds containing metallic tungsten. A communication.

3148. W. Nunn. Improvements in stereoscopic apparatus.

20. R. A. Brooman. An improved lock buckle. A communication.

204. R. Harland. Improvements in the break lever guard of railway trucks.

267. J. Horsey. An improvement in india-rubber and other elastic band or ring fastenings.

342. J. Davis. Improvements in cornets and other wind musical instruments.

414. J. N. Hearder. Improvements in submarine telegraph cables.

470. H. Doulton. Improvements in the manufacture of smoke and air flues.

472. W. Clark. Improvements in gas meters. A communication.

474. J. E. Poynter. An improved illuminating oil.

507. L. F. Corbelli. An improved process for extracting aluminium from its compounds, and obtaining at the same time protochloride of mercury. Partly a communication.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

645. Frederick Ransome.
664. John Henry Johnson.
671. John Marland.
700. John Blair.
709. William Tytherleigh.
711. Manning Prentice and Thomas Richardson.
712. Joseph Morgan.
741. Peter Rothwell Jackson.
786. Peter Armand le Comte de Fontainemoreau.

LIST OF SEALED PATENTS.

Sealed March 25th, 1858.

2254. Alfred Vincent Newton.

Sealed March 26th, 1858.

2499. William Bayliss.
2514. Christopher Crabb Creeke.
2517. William Henderson.
2521. Evan Leigh.
2522. Josiah George Jennings.
2524. Sydney Doolan Hamilton.
2570. Alexander Boyd.
2580. William Richard Todd, jun.
2586. Samuel Walmsley.
2846. John Richard Cochrane.
3101. Edward Highton.
47. Edward Hammond Bentall.
112. Henry Smith.
142. Luigi Ferrari Corbelli.

Sealed March 30th, 1858.

2419. Daniel Imhof.
2516. William Sandilands.
2518. James Harris.
2520. James Long and Joseph Long.
2538. John Atherton Molineux and Joseph Nichols.
2562. James Stoneham and John Pipler Lees.
2568. Robert Romaine.
2636. Charles Reeves.
2678. Marc Antoine François Mennons.
2694. Marc Antoine François Mennons.
2738. William Edward Newton.
2. James Murphy.
16. James Leeming and John Carter Ramsden.
138. Sir Henry Stracey, Bart.
208. David Williams.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICE TO CORRESPONDENTS.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

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MESSRS. SEWARD'S PATENT BOILER FOR HEATING AND CIRCULATING WATER.

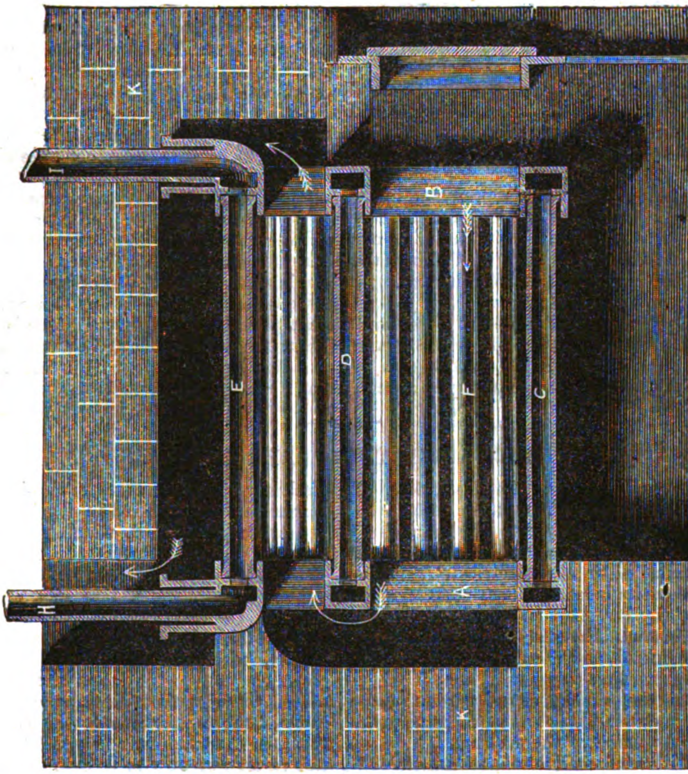


Fig. 2.

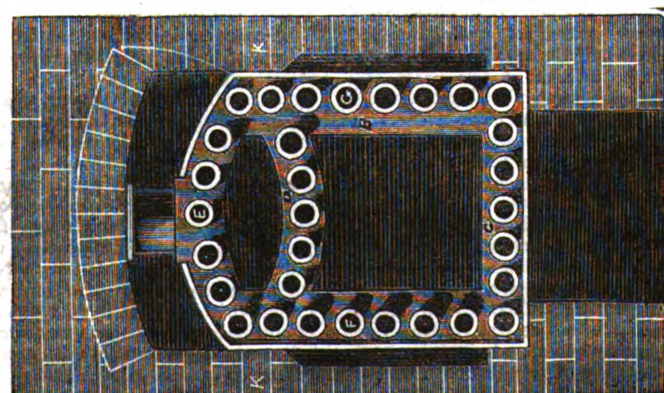


Fig. 1.

MESSRS. SEWARD'S PATENT BOILER FOR HEATING AND CIRCULATING WATER.

AMONG the numerous water-heating apparatuses lately introduced we know of none equal in economy and efficiency to that recently patented by Messrs. A. and C. Seward, of Lancaster. Their improved boiler is formed by combining two similar upright castings with sets of horizontal pipes, as follows:—The upright castings are formed hollow, and with a number of sockets, into which are cemented the ends of a corresponding number of horizontal pipes, the length of which determines the capacity of the boiler. Of these pipes there are two side-sets, in each of which the pipes are arranged one above another, and three trasverse sets, in each of which they are arranged side by side. The castings are also furnished with suitable inflow and outflow pipes. The fire is placed upon the lower set of transverse pipes, and the flame and hot gases from it pass between the lower and the middle set,—the spaces between the pipes of the middle set being closed up,—return to the front between the middle and upper set, and again pass to the back above the upper set, finally passing off by the chimney. The ends of the several sets of pipes open into the hollow castings, and the water, as it is heated, is compelled to circulate through the pipes and castings, and away through the outflow pipe or pipes.

The improved boiler is represented in the engravings on the preceding page, of which fig. 1 is a transverse section, and fig. 2 a longitudinal section. A and B are the two upright castings which form the ends of the boiler, and C, D, E, are, respectively, the lower, middle, and upper sets of tubes, the ends of which are all cemented into sockets in the castings A and B. By increasing or diminishing the lengths of these tubes the capacity of the boiler may, manifestly, be increased or diminished. F and G are the side-sets of pipes. H and I are the inflow and outflow pipes respectively. The fire is lighted upon the tubes C, and the flame and gases pursue the course indicated by the arrows in fig. 2. The brickwork, K, on each side of the boiler is placed about 2½ inches from the side pipes, so that the fire may play around them.

SUBMARINE TELEGRAPH CABLES.

AT the Meeting of the Institution of Civil Engineers, on March 30, 1858, the proceedings were commenced by the reading of the following abstract of a paper entitled "Observations on the Electrical Qualifications requisite in long Submarine Telegraph Cables," by Mr. Alfred Varley.

The communications lately read, and so fully discussed, on the subject of submarine telegraphy, had suggested the inquiry, whether the cables, as at present constructed, did fulfil, in the best manner, the electrical portion of the problem.

The laws of conduction, as ascertained by the author, as the result of direct experiments, were—1st. That a wire one mile long offered half the resistance of one two miles long. 2nd. That two wires, each two miles long, when placed side by side, which was the same as one of double the area, offered the same resistance as one wire one mile long. With regard to induction, the results of experiments tried by the author, and Mr. C. John Varley, showed that with flat plates it followed the same law as conduction, decreasing in regular proportions, as the insulating medium was increased; that was to say, if the inductive force through one plate was twelve, through two plates it would be six, through three plates, four, and so on. In a gutta-percha covered wire, it probably did not follow precisely the same law, as when the insulating materials were increased in depth, the surface was also enlarged, which partly counteracted the effect of greater thickness. Mr. C. J. Varley had tried some experiments which went to show, that in a wire one-tenth of an inch in diameter, coated to the depth of one-tenth of an inch with gutta-percha, making a total of three-tenths, when compared with one of the same size, coated to twice that depth, the inductive force of the former was to the latter as 4 to 3¼, or thereabouts, and not 4 to 2; but this result was only to be considered as an approximation.

The conclusion arrived at by the projectors of the Atlantic Telegraph, that in a submarine cable a small wire conducted more rapidly than a large one, was thought to be erroneous. If a battery of six cells, with six inches of surface in each cell, was connected through a circuit of nominally no resistance, a much greater quantity of electricity would be found to pass than when connected through a long fine wire perfectly insulated. In a battery with the same number of cells, but with twice the surface, and capable, consequently, of giving out twice the quantity, through a circuit of nominally no resistance, no more, practically, would be found to be passing, the resistance of the wire measuring out the

amount, something in a similar way to water flowing out of a small pipe inserted into the bottom of a cistern. The series might be added to, cell by cell, until, practically, as much was forced through, as the battery originally generated, along a circuit of nominally no resistance. After this had been arrived at, a further addition would not make any perceptible difference, as there was already power enough to force through all that the battery was capable of generating, and the amount of force given out was always proportionate to the dynamic quantity flowing through the instruments. Intensity was only the medium which forced through this dynamic quantity.

The three following conclusions, which had been introduced into previous discussions, were then referred to:—1st, That a submarine circuit was a Leyden jar, which had to be charged to saturation, before passing a signal through; and consequently, the smaller it was, the sooner it was charged, therefore following a different law to that of a suspended wire, which probably followed the law of squares;—2nd, That the rapidity of signalling with voltaic currents was not effected by the intensity of the battery;—and 3rd, That magneto-electric currents travelled more rapidly than voltaic ones, and also increased in rapidity when their intensity was increased. The author, in differing from these conclusions, did not wish it to be understood, that he thought the law of squares applied to submarine wires; for he knew of no electrical phenomenon which obeyed this law. It was submitted, that there was a material difference between a Leyden jar and a submarine circuit. In a Leyden jar the inner and outer coatings were perfectly insulated from each other. If they were not insulated, there could be no statical charge; induction, therefore, involved insulation. The fact was frequently overlooked, that the only real insulation in a submarine circuit, was the resistance opposed by the wire to the passage of the current, for it united both, being in contact with the earth at both ends. If it offered no resistance, there would be no insulation, and, consequently, no induction; and in proportion to the resistance it offered, providing always the insulating medium was of the same thickness, would induction be manifested. In the case of a suspended wire, the insulating medium of the air took the place of the gutta-percha of a submarine cable. The earth, the nearest conductor, being a long way off, and only on one side, no large amount of induction could take place between the earth and the wire; nevertheless, it did take place to a certain appreciable extent. Indications of it had been noticed in a circuit 60 miles long, and it was believed that it could be perceived in much shorter circuits with delicate apparatus. If the wire was brought nearer to the earth, induction would be developed more strongly, and it might be brought down, step by step, until the condition of a submarine wire was approached, where the earth surrounded the wire on all sides, and was only separated from it by the three-sixteenths of an inch of gutta-percha, a substance possessing specifically a very much greater inductive capacity than air.

It was mentioned, that a wire of a given length offered the same resistance to a given quantity of electricity, that a wire of double the length did to half the dynamic amount. From this it was deduced, that all wires offered an infinitely small resistance to an infinitely small amount of electricity. The action of a battery when connected to send a current along a submarine wire was then considered, and it was remarked, that the wire and the earth being only separated by the thin layer of gutta-percha, induction could readily take place. Whilst the wire itself opposed great resistance to the quantity of electricity the battery was capable of generating, the effect would be to form a wave throughout the wire; but as there was but little resistance, comparatively speaking, to induction taking place, the greater portion of the first impetus would be occupied in charging the wire statically near the battery end. A very minute amount would begin immediately to flow at the further extremity; and in proportion as the tension of the wave of charge rose throughout the wire, so would the flow increase, both reaching their maximum together. When the wire was disconnected from the battery, this current would continue to flow out in a decreasing stream, as the tension of the wave of charge lowered, both ceasing at the same time. In the case of a submarine wire, it was asserted, that as no induction worth naming could take place, there could be no accumulation of statical charge worth noticing; the whole impetus was therefore directed forward, and not diverted laterally; consequently, signals were found, for all practical purposes, to pass instantly. In the case of a submarine wire, the time elapsing between the contact of the battery and the appearance of the current, would be dependent on the sensitiveness of the instruments to record small amounts of electricity.

The relative amount of induction was decreased, when the wire was enlarged; for, whilst the substance increased as the square,

the resistance decreasing in the same proportion, the surface on which induction depended only increased in regular proportion. Supposing four cables were employed as one conductor, although there would be only one-fourth of the resistance, signals would not pass through more quickly than through one, for the inductive surface was also increased four times; but if these cables were merged into one, whilst the inductive surface would be reduced one-half, the resistance would not be increased. It was believed, therefore, that if the diameter of a conductor was doubled, signals would pass through twice as quickly with the same depth of insulation.

The relations subsisting, telegraphically, between quantity and intensity of electric currents, demonstrated, that if the insulation was imperfect, larger dynamic quantities gave a better chance of working through. Cases had occurred where increasing the intensity of the battery had produced no perceptible advantage, whilst increasing the surface in each cell had a very decided effect. A case was instanced where, on a leaky circuit of upwards of 212 miles in length, the deflection on the galvanometer had been raised from 23° to 53°, by increasing the surface, without adding to the number of cells.

The effect of employing batteries of very high intensities for submarine wires, with a view to increased rapidity of signalling, was then considered; and it was stated that, as with high intensities there was greater energy to force through resistance, the wave of charge would arrive at its maximum more quickly than with a lower intensity, and signals would be passed through sooner. The reason why an increase in the rate with voltaic currents had not hitherto been observed, when the intensity of the battery had been increased, was explained.

The results with magnetic electric currents, would, it was thought, be more decided, for their intensity was many times as great as that of the voltaic currents which had been employed. For instance, it would take twelve hundred cells to spark through a space of air only one-hundredth of an inch; but this intensity would be a very low one for a magneto-electric current, whose intensity could be increased to almost any extent. A voltaic battery might be compared to a hydraulic ram, and a magneto-electric machine to a fly-press; both might be capable of raising a given weight, but one would do it more suddenly than the other.

In conclusion, it was remarked, that it was impossible to believe that nature, whose laws, science, as she progressed, invariably proved to be simpler and yet more simple, should have one law for one conductor, and another for another; and that electric currents, having all the same properties in common, should be differently affected when their intensity was increased or diminished.

FRICTIONAL ELECTRICAL MACHINES.

At the second monthly Meeting of the Plymouth Institution, for the delivery of original papers intended for publication in the Society's proceedings, Mr. Hearder delivered a paper, on the construction and action of electrical machines, with a description of a new modification of the apparatus, and a comparison of the relative quantities of electricity excited by plates and cylinders, of which paper the following is an abstract.

It is a remarkable fact, that, whilst of late years the means for exciting and applying voltaic electricity have undergone extraordinary improvements, electrical machines for exciting electricity by friction have undergone no improvement during the last fifty years, and their action is not better understood now than it was then. It is true that they have been made of larger dimensions, but it is a great question whether the large machines of the present day excite as much electricity, from equal rubbed surfaces, as those which were made by Nairne, Cuthbertson, and others of their time.

The action of the amalgam is still involved in mystery, and the peculiar functions of the different parts of the machine have never, to the author's knowledge, been thoroughly investigated.

Thirty years ago the author remarked the extraordinary difference in the quantities of electricity relatively excited by plates and cylinders from equal rubbed surfaces, and under the same favourable conditions, cylinders developing more than four times as much electricity as plates from the same amount of surface. In order to examine these circumstances fairly, the author undertook an examination of the subject more than twenty years since, and the interesting results then obtained, which have never yet been published, still appear to be new, since up to the present time the author is not aware that the subject has been examined by others, or that the facts which he then elicited have ever been noticed by any one else.

In order to determine the relation between the quantity of electricity excited and the amount of surface rubbed, a cylinder machine was mounted, having four separate

rubbers, which could be substituted for each other; their lengths were respectively one inch, two inches, four inches, and eight inches; each had a silk flap to match. The surfaces thus rubbed were in the relation of one, two, four, and eight, and the results obtained, as tested by the charge and discharge of a standard Leyden jar, were exactly in the same ratio.

Secondly, in order to examine the function of the silk flap a machine was so mounted that its flap could be made of any length, and the conductor was contrived so as to have its receiving points brought close to the delivering edge of the flap.

The number of turns required to produce the same amount of charge with different lengths of silk flap were as follow :—1 inch, 60 turns; 2 inches, 34 turns; 3 inches, 24 turns; 4 inches, 21 turns; 5 inches, 21 turns. Beyond this point there was no advantage in increasing the length of the flap.

Availing himself of this fact, the author contrived a cylinder electrical machine having two rubbers, the second one being placed on the side of the cylinder opposite the first. The conductor was furnished with vertical branches, passing above and below the cylinder, to collect the electricity from the two flaps. By this means double power was obtained from the same machine. The next step was to investigate the action of the plate machine, and, by careful examination, it was found that the power developed by it is equal to the sum of the effects of the rubbers taken singly. It is a strange fact that, although the plate is excited on both sides, yet the approximation of the conductor to one side only is sufficient to take up nearly the whole of the electricity excited.

Experiments have been made with plate electrical machines of the best construction, and of various sizes, and, where the conditions are equal, their power relatively to their surfaces is very nearly alike. Sir W. S. Harris's splendid 36-inch plate machine developes the same amount of electricity from an equal surface as an excellent double 24-inch plate machine belonging to the author.

On comparing, however, plate machines with cylinders, there is an extraordinary disparity in the amount of electricity developed from equal surfaces, the latter exciting between four and five times as much as the former. The author has determined this fact by a great variety of experiments and under conditions which preclude the possibility of error, and it opens a very curious field for inquiry.

The author believes that the cylinder derives much of its superiority from the fact that the re-induction of the internal charged surfaces upon each other determines all the electrical effects to the circumference, just as an electrified hollow metal cylinder appears electrical only on its outer surface, whilst the plate machine has both its excited surfaces exposed to the inductive action of surrounding objects.

The author, however, is not prepared to maintain that this is the only cause of superiority. The difference in the chemical composition of the gloss and the mechanical condition of the two surfaces—the plate being ground and polished and the cylinder having its normal surface of fusion—might operate very differently in modifying the development of electricity.

WATSON'S PATENT VENTILATORS.

Most of the ships of the Royal navy, recently fitted for sea in our dockyards, have been furnished with a number of ventilating apparatuses, the invention of Mr. Charles Watson, of Halifax. These contrivances, as they stand up considerably from the deck, and are therefore much in the way of the seamen, are not viewed with favour by the naval officers, and it will, perhaps, not be very uncharitable to assume that they would scarcely have received all the patronage accorded to them in that branch of the service had not the Member for Halifax happened to have been the First Lord of the Admiralty. Mr. Watson's ventilators, which are applicable to buildings of every description, are of very simple construction. A single tube or flue is employed for the purpose, divided throughout into two passages or shafts, one for the descending fresh air, and the other for the ascending vitiated air; this divided tube generally passing through the roof of the building, and forming a direct communication from the ceiling of the apartment to be ventilated to the external atmosphere. It can, however, be adapted to almost any situation, and has been applied to buildings of many floors or flats, and to the lower and middle stories of lofty factories, where the heat and steam are withdrawn by a modification of the same arrangement, without taking the ventilating tube through the floors above to get through the roof, the tube being taken through the side wall and terminating outside at the required level.

The simplest and most useful form of the ventilator is shown in Fig. 1, in which it consists of a vertical circular tube, A, of a size proportioned to the size and occupa-

tion of the room to be ventilated, divided longitudinally into two passages by a continuous partition, B, extending to the top. The upper end of the tube is surmounted by a cap, C, extending all round to some depth below the top of the tube, for protecting it from rain and wind. The central partition of the tube is carried up to join the cap and complete the separation between the two passages or shafts. A regulating valve, D, is placed at the bottom of each of the passages, both of which are opened and shut simultaneously by a single cord, thus diminishing or increasing at pleasure the area of passage for the air.

Fig. 1.

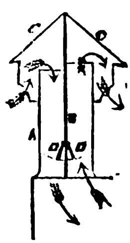
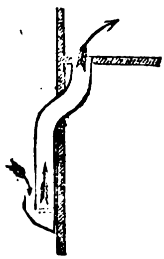


Fig. 2.



In a recent paper upon these ventilators, read at the Institution of Mechanical Engineers, by Mr. S. Thornton, of Birmingham, the author says, it is found in practice that in the arrangement above described there is so strong a tendency to the establishment of the two currents, one descending and the other ascending, from the downward pressure of the cool external air being greater than the upward pressure of the warm internal air, that when two separate passages are thus provided the two currents are at once set up, and a very slight difference between the two passages is sufficient to determine their direction; when once established, the two currents continue regularly and uninterruptedly, the one side of the ventilator becoming permanently heated and the other side cooled by the respective temperatures of the two currents. In order to fix previously which is to be the ascending side, and to prevent any risk of check or reversal of the currents by accidental causes, the ascending side of the ventilator is carried up a little higher within the cap than the other side, and this is found fully to effect the desired object.

By adapting the size of the tube or the number of the ventilators to the number of persons to be accommodated, the number of gaslights burning, or other causes necessitating ventilation, a building can be thoroughly ventilated by this plan, however crowded it may be, without any person feeling inconvenience from the presence of bad air, heat, or unpleasant effluvium, or from draughts of air at its admission or withdrawal; and this plan of admitting the fresh air at the top of each room is the only effectual means of supplying the very large quantity required in many cases, without involving the objection of draughts. The means of regulating the passage of air both into and out of the rooms is so completely under control in this apparatus that the amount of ventilation required for a large number of persons in one building can in a few minutes be diminished to the proportion necessary for a small number, so that the temperature of the building may be kept comfortable, whether in cold or hot weather.

To meet particular cases some modifications in the arrangement of the apparatus are made; and the ventilating tube, although wherever practical made straight and vertical, has been successfully applied in a moderately bent form, as shown in Fig. 2, where it is required to ventilate the lower portion of a lofty building. In this case the tube is made to deviate as little as possible from the straight vertical form, and terminates close to the external wall at from 10 to 20 feet height above the ceiling of the room to be ventilated.

Fig. 3.

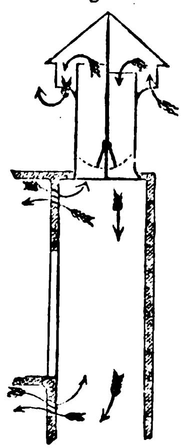
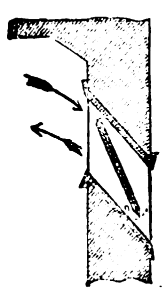


Fig. 4.



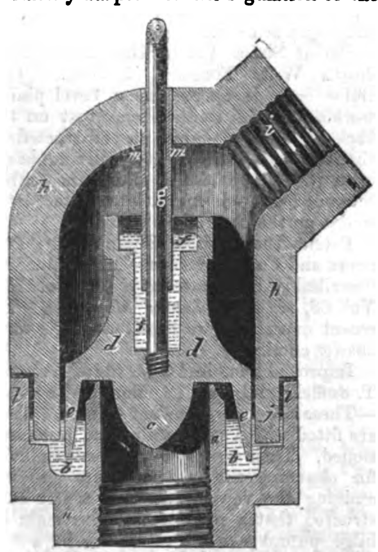
Another modification of the plan is shown in Fig. 3, where several floors of a house are ventilated into a common staircase, upon the top of which is placed one of the vertical ventilators of suitable size; the communications from the several rooms are made by

an opening over the door of each, as in Fig. 4, which is divided into two passages by an inclined partition, D, in the centre, the upper passage taking out the heated air and the lower one admitting the fresh air.

An important application of this ventilator has also been made, says Mr. Thornton, to emigrant ships. In one vessel with 400 on board, the whole were kept down between decks for five or six days during a violent storm, with the hatches fastened down, but without any inconvenience as to ventilation. When applied to ships these ventilators answer also the purpose of deck lights. For large steamers they have been applied with great advantage to cool the engine-room and stoke holes, dispensing with the usual air gratings on deck that have to be closed during a storm and heavy rains; these ventilators admit no water during a storm, the firemen are kept cool without dangerous draughts, and by the plentiful supply of pure air the draught of the furnaces is improved. The application to ships freighted with such cargoes as sugar and fruit would permit of the cargoes being discharged in a dry and more valuable condition, in consequence of the constant withdrawal of the heat and moisture during the voyage.

WILLWAY'S PATENT GAS VALVE.

Mr. J. S. Willway, gas-engineer, of Bristol, has patented a gas valve which is peculiarly adapted to the regulation of the



supply of gas from distant parts of buildings, by means of wires (resembling bell wires), or otherwise. The improved valve is represented in section in the accompanying engraving. *a*, is a neck or collar into which the mouth of the gas supply tube screws, and which rises inside so as to form a cup, *b*, in which is placed mercury, or a ring of india-rubber. The collar, *a*, receives the cone, *c*, forming part of the valve, *d*, which has also formed on it the ring, *e*. This ring, by entering the mercury, or descending tightly against the india-rubber, forms a sealed joint. *f*, is a second cup for containing mercury, and *g*, is a rod rising from it. *h*, is the cover in which is the aperture, *i*, for the passage out of gas to the burners or elsewhere. The bottom part, *j*, of this cover enters the mercury in the cup, *b*, while at the joint it rests upon the upper rim, *l*, and the parts are held together by screws through lugs at the side. From the top of the cover, *h*, descends the pipe, *m*, through which the rod, *j*, passes, and which dips into the mercury in the cup, *f*, to prevent the escape of the gas. By raising and lowering the valve, *d*, by means of the rod, *g* (which, as we have intimated, may be conveniently done from a distance), the supply of gas through the outlet, *i*, can be shut off, fully opened, or regulated at will.

The improved valve is cheaply manufactured, easily kept in order, and found to answer its design perfectly.

EXHIBITION OF INVENTIONS AT THE SOCIETY OF ARTS.

The tenth of the Society of Arts' very interesting Exhibitions of Inventions has now been opened, and is, to say the least, not inferior in importance to those which have preceded it. Viewing the inventions in the order in which they are numbered, we notice first the patent reciprocating furnace bars of Mr. J. Chanter, Bromley St. Leonard's, Bow-road, London. These bars are moved to and fro by a hand lever, fixed to a rocker, which cleans the entire surface of the grate without opening the furnace door. The bars are made in both single and double lengths. The dead plate is formed with slits or openings, which, upon the bars being worked backwards and forwards, are opened and closed, thus giving a sufficient supply of air to the furnace, at the moment the coals are temporarily disturbed for clearing the grate, so as to cause perfect combustion, and prevent smoke.

We come next to the Patent Double-backed Double Boiler by G. and W. Steell, Richmond, Surrey.—This boiler is formed of two half cylinders, with backs, the top one being longer than the bottom

one, and so much larger as to leave a flue between the half cylinders; the first contains the fire, which plays on the back of the bottom part of the boiler, after which it acts on the back of the second, and passes through between the half cylinders and returns over the top, by which time the heat is totally exhausted. The two are connected by a pipe in front and back, which joins them together, giving all the circulation possible.

The next is a Steam Boiler by Taylor and Rolfe, Northill, Bedfordshire.—This boiler has a water chamber within the flue, and communicating with the outer boiler by means of pipes, extending from the bridge backwards, concentric with the flue, with space all round for the products of combustion. The furnace bar frame is hollow, slides in from the front, communicates with the boiler, and is in a piece with the bridge, which is also hollow; the bars are also hollow, and connect the furnace bar frame with the bridge. The water circulates through these hollow parts freely.

Patent Feed-water Heater for Steam Boilers; John Randolph Sees, New York. —Here the feed-water passes through a coil of pipes placed in the breaching or in the smoke box of the boiler, and thus becomes heated; this is stated to effect a saving of 25 per cent. in fuel. There is a check-valve which allows of the circulation being kept up when the feed-pump is not at work.

Safety Apparatus for Steam Boilers; W. Mann, City of London Gas Light and Coke Company, Dorset-street, Salisbury-square. —This invention was elaborately described and illustrated at p. 49, No. 1797, Vol. 68, *Mechanics' Magazine*.

Patent Mercurial Compound Steam and Vacuum Gauge; Mather and Platt, Salford Iron Works, Manchester.—In this gauge the mercury in the glass tube balances the mercury in the rising column when the pressure is on. One characteristic of this invention is that it is *self-detecting* of its own accuracy at any moment it is desired to test it. Thus, suppose the steam-tap open, the pressure indicated 30 lbs.; close the steam-tap, and the mercury will at once rise to zero; if not, the difference is at once seen. Now open the tap leading to the condenser, and you get the vacuum in lbs. —say 13 lbs. Now open the steam-tap, and you will have indicated 43 lbs.— 30 lbs. steam and 13 lbs. vacuum. By this means the number of horse-power might be shown on the scale of the gauge, where the speed of the engine is uniform and the area of cylinder calculated for, if the steam be taken between the throttle-valve and cylinder.

Pressure Gauge; J. Allen, Boston, U.S.A.—The peculiarities of this gauge are, the combination of a piston and flexible diaphragm with a bow or hoop spring and rack and pinion; the use of a cup-shaped flexible diaphragm, contained within a spheroidal chamber for giving motion to the indicator, and the use for the same purpose of a helical spring, of a dome or cup-shape, in combination with a capsule of vulcanized india-rubber. These gauges may be applied either as vacuum or pressure gauges.

Hot or Cold Blast Indicator or Pressure Gauge; Joseph Cadman, Bridgend, Glamorganshire.—This instrument is intended to indicate the blast at the furnace tuyere, as well as the loss from leakage, &c., in the air pipes. This is effected by a valve in connexion with a steelyard graduated and weighted in the usual manner.

Blast Whistle with Weights; Joseph Cadman.—In this instrument the weights on the valve stem represent the pounds pressure or pillar of blast required by the manager, and the whistle is so arranged as to sound the alarm only when the blast is less than the required pressure, and thereby becomes a tell-tale against the engineer.

Slide Valve; W. E. Ellis, Vulcan Foundry, Warrington.—Valves are placed between the steam and exhaust ports in this slide valve, which are worked by the admission of the steam by the slider. In consequence of this, there is no premature compression or exhaustion, however great the lap may be, and the exhaust is thrown fully open at once.

Patent Sluice Valve; Brown and May, North Wilts Foundry, Devizes.—This sluice cock is opened by a bevel pinion working into a toothed rack cast on the back of the sluice, and is constructed so that one turn of the spindle will completely open it. When closed, the faces (either brass or iron) are forced into contact by a wedge on the back of the sluice.

Patent India-rubber Pump Valve; Perreaux and Co., Mark-lane.—This valve was described and illustrated at p. 513, No. 1764, Vol. 66, of the *Mechanics' Magazine*. By recent experience we have found this valve answer admirably.

Improved Double-Action Ships' Pumps; T. Suffield and Co., 13, Bermondsey-wall. —These are very excellent pumps. They are fitted with Perreaux's valves, just mentioned. Their arrangement affords facilities for cleansing the suction pipes and examining the valves, and they are so constructed that a pair of common main or bilge pumps can be converted in a few minutes into a powerful fire pump.

Single Action Ships' Pump; T. Suffield

and Co.—This pump is on the same principle as the foregoing.

Murray's Patent Improved Pump. Exhibited by Thos. Middleton, engineer, Loman-street, Southwark.—In this pump the lifts are joined to the chains at right angles, and allow them to pass over a small tooth pulley at the top and a bend at the bottom, so as to feather the lifts on the return side. This pump is not liable to be choked, as any foreign substance getting between the lift and the barrel would, by a partial back-turn of the chain, be immediately released, the lift folding up and letting the substance free.

Patent Oscillating Pumps; David Falconer, Causeyside-street, Paisley. — The chief features in these pumps are certain flexible chambers of leather or india-rubber.

Tubular Air-heating Apparatus for the Ventilation of Mines; J. M. Paull, Alston, Cumberland.—This apparatus consists of a series of tubes built into the chimney above the furnace, with one end opening into the mine and the other into an upcast shaft. By this arrangement all the air, pure or impure, and even explosive gases, may be brought into contact with the rarifying agent without risk of accident.

Dubrulle's Patent Safety Lamp. Exhibited by J. W. Lord, Boar-lane, Leeds. —The improvement consists in the arrangement for preventing the lamp from being opened without being previously extinguished.

(To be continued.)

THE IRON SCREW STEAM-SHIP "NORTHAM."

The launch of a new iron steam-ship is now a matter of too common occurrence to demand notice in our pages; but there are circumstances connected with the launch of the *Northam* on the last day of March, which deserve special remark. The *Northam* was launched from the ship-yard of Messrs. Summers and Day, iron ship-builders, at Northam, about a mile from Southampton, on the river Itchen. She is an iron screw steamer of 1,600 tons burden, and 400-horse power. Her length over all is about 300 feet. She is the largest iron steamer ever built in the neighbourhood of Southampton; she is also a beautiful model, and immensely strong, being built with numerous improvements, including one or two recent inventions which have not been tried in other ships. At the suggestion of Captain Engledue, the able and liberal Superintendent of the Peninsular and Oriental Company, in order to add to the luxury of the sleeping cabins of the *Northam*, a novel arrangement of jalousies or Venetian blinds is substituted for windows. Each sash of these blinds is very wide, and formed of two parts joined by an invisible hinge. When the blinds are closed the two parts lap over each other; but a passenger, as he lies in his bed, can touch a spring and the two parts of each sash will open to any extent necessary to let in light and air from the saloon, and so ingeniously is this contrived that the opening will not enable any one to see into the cabin from the saloon. These improved blinds are the subject of a patent now in progress. In the *Northam* the screw also is placed so low in the water that, while it is strictly within the line of effective propulsion, no rolling of the ship can lift it out of the sea and render it inoperative. By the addition of the new vessel, the number of ships belonging now to the Peninsular and Oriental Company's fleet is brought up to forty-five—equal in number to the sailing fleet of the United States navy. Messrs. Summers and Day were congratulated on the beauty of the ship, and the success of the launch, which went off admirably. Mr. Summers is one of those men who contribute to spread the fame of England far and wide. A most ingenious and practical mechanician, he has, by the exercise of unswerving probity and industry, risen from obscurity to eminence, and been a great benefactor to Southampton. At Northam he has erected, at a cost of thousands of pounds, an iron shipbuilding yard and a steam factory.

Scientific Detection of Burglars.—During the present week an examination took place at the Bow-street Police-court, which illustrates the facility with which electricity may be applied, in the hands of a scientific man, to the detection of burglars. Mr. T. Allan, of London, having lost articles at various times from his factory in the Adelphi, placed the wire of one of his patent electrical signal apparatus in connexion with a window through which the burglars were supposed to enter, and led the other end of wire to his residence in the neighbourhood. On the succeeding evening the signal bell set up a violent ringing, and Mr. Allan, proceeding at once to the factory, surprised the burglars, and captured one of them. The police were immediately sent in search of the other, who was also identified. This is the first instance of the kind which has come to our notice, and proves the efficiency of Mr. Allan's apparatus, which may be readily applied to signalling on railways, to cases of fire, &c.

STABILITY OF FLOATING BODIES.

To the Editors of the Mechanics' Magazine.

Gentlemen,—The question brought before the notice of your readers in your last number by "Nauticus" is one of considerable interest. The principle involved in the first quotation he adduces is undoubtedly incorrect, being a hasty and unphilosophical generalization of a principle which is true enough in the case of a body acted on by no other force than gravity. This is far from being the case with a body floating in a fluid. Its position is then due to the action of *two* antagonistic forces, viz., gravity, and the resultant fluid pressure: the former of these acts vertically downwards through the centre of gravity—a fixed point; the latter acts vertically upwards through the centre of gravity of the displacement, or centre of buoyancy, which is not a fixed point, but varies with every position of the body. Any general statement with regard to the nature of a floating body's stability which takes notice of *one only* of these points must necessarily be erroneous.

In almost all, if not all, cases of stable equilibrium it will be found that the distance between these two points is less than in any of the positions of unstable equilibrium which the body can assume. This, however, is not mathematically demonstrable—or, at all events, has not been mathematically demonstrated. All that can be said is, that it is found generally to hold good; it would, however, be unphilosophical to assert it as a general proposition, unless it can be proved to be *always* true. I shall presently show that it holds in all the cases adduced by "Nauticus."

The measure of stability, when a body is displaced through an infinitesimally small angle; in other words, the height of the metacentre above the centre of gravity is,

$$\frac{\text{Moment of inertia of plane of flotation}}{\text{Volume of displacement}}$$

minus the distance between the centres of gravity and buoyancy.

The position may be unstable from one or both of two causes—1st, because the moment of inertia of the plane of flotation is *too small*, which will generally be the case when the magnitude of this plane is small compared with other parallel sections of the body—as when the cork prism is placed in the fluid with its vertex downwards; 2d, because the distance between the centres of gravity and buoyancy is too great.

It is also manifest that, *cæteris paribus*, the shorter this distance the more stable is the position of equilibrium. These considerations would lead one to suspect that the fact above communicated is generally true in cases of stable equilibrium, although not capable of a direct proof.

It would not be difficult to prove that, in order that an equilateral triangular prism should float in stable equilibrium in a fluid with the base horizontal and downwards, as in fig. 1 of "Nauticus," the specific gravity must be less than $\frac{7}{16}$; that it may float with the vertex downwards and base horizontal, as in fig. 3 (the dry ash), the specific gravity must be greater than $\frac{9}{16}$. For intermediate values of the specific gravity, *i.e.*, between $\frac{7}{16}$ and $\frac{9}{16}$ the prism will float with one angle immersed until the *s. g.* is $\frac{8}{16}$, or $\frac{1}{2}$, when the position will be that of fig. 2; and afterwards with two angles immersed, none of the sides being horizontal. In every one of these cases it will be readily seen that the dimensions of the plane of flotation are greater for the given specific gravity than they would be for any other position of equilibrium, which would be one of instability. This may be seen, for the cork prism, by comparing figs. 1 and 4; for the prism of dry pine, by comparing figs. 2, 6, and 7; and for that of the dry ash, by comparing figs. 3 and 5. The actual computation would be by no means difficult to make.

Again; it is easily seen that, when floating, as in fig. 1, the distance between the centres of gravity and buoyancy

$$= \frac{a(1-s) - a(1-s)^{\frac{3}{2}}}{s\sqrt{3}} \quad \ldots\ldots \ (1)$$

where, a, is a side of the triangle and, s, the specific gravity. When floating as in fig. 3,

$$\text{this distance} = \frac{a}{\sqrt{3}}(1 - \sqrt{s}) \quad \ldots\ldots \ (2)$$

and as in fig. 2, when $s = \frac{1}{2}$

$$\text{this distance} = \frac{a}{6}$$

Now let $s = \frac{1}{4}$ or the position of stable equilibrium be that of fig. 1; in this position the distance between the two centres

$$= \frac{a}{2\sqrt{3}}\ (2 - \sqrt{3})$$

and in fig. 3, or in a position of unstable equilibrium, $= \frac{a}{2\sqrt{3}}$

The ratio of these distances

$$= 2 - \sqrt{3} : 1 \text{ or } \cdot 27 : 1$$

Let $s = \frac{1}{2}$, the distance in both these positions is the same, viz., $\frac{a}{\sqrt{6}}\ (\sqrt{2} - 1)$

while in that of stable equilibrium, fig. 2, it is $\frac{a}{6}$

The ratio is

$$\frac{\frac{\frac{1}{6}}{\sqrt{2}-1}}{\sqrt{6}} : 1 = \frac{1}{\sqrt{12}-\sqrt{6}} : 1 = \frac{\sqrt{12}+\sqrt{6}}{6} : 1 = \cdot 985 : 1.$$

Let $s = \frac{3}{4}$,

Then, in fig. 1, or that of unstable equilibrium, distance between the centres

$$= \frac{a}{2\sqrt{3}}$$

and in stable equilibrium it

$$= \frac{a}{\sqrt{3}}\left(1 - \sqrt{\tfrac{3}{4}}\right) = \frac{a}{2\sqrt{3}}\left(2 - \sqrt{3}\right).$$

Hence the ratio $= 2 - \sqrt{3} : 1$ or $\cdot 27 : 1$.

In all these cases, therefore, the distance of these centres in the case of stable equilibrium is less than in that of unstable.

I have not Mr. Moseley's "Mechanics applied to the Arts" by me; but I cannot help suspecting that "Nauticus" has missed the point of the statement which he quotes. Inasmuch as when a body is displaced from a position of equilibrium, in order to maintain the equality of displacement, as large a fresh portion must be brought under the water on the side *towards the direction* of revolution, as is carried out on the other, it follows from both these causes that "the centre of gravity of the part immersed" must necessarily move "from the direction of revolution." In no possible case could it move otherwise, with regard, that is, to the place of this point when in the position of equilibrium.

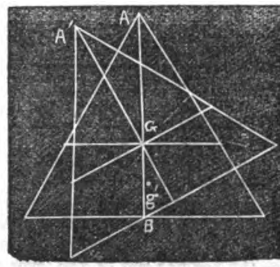
If, therefore, Mr. Moseley's principle is rightly interpreted by "Nauticus" it is not only wrong, but involves an absurdity. This I can hardly believe: I must therefore suspect that "Nauticus" has misapprehended it.

The fact is that, as this point must always move in one direction, which is also the direction of the motion of the centre of gravity of the body relatively to the centre of buoyancy, except when the centre of gravity is below it, which is altogether exceptional; the equilibrium is stable or unstable, according as the horizontal motion of the centre of buoyancy is greater or less than the *relative* horizontal motion of the centre of gravity.

What I believe Mr. Moseley to mean is this:—

The centre of gravity of a floating body, when it is displaced, rises or falls in a vertical line; hence a vertical line through this point is fixed in space during this motion. During the motion, then, not only will the centre of buoyancy alter in consequence of the alteration of the volume of the body immersed, but the *whole* will shift in the direction of revolution. If this latter motion be greater than the former the position is one of unstable equilibrium. If it be less it is one of stable equilibrium. This amounts to the same thing as the statement I have already made.

The following figure will illustrate my meaning. In the case of fig. 9 (p. 324), G, the



centre of gravity of the prism, is in the water line, and the prism takes the new position after rotation, as shown in the figure. In this case, g', the new centre of buoyancy, lies to the right of A G B, the fixed vertical line through G; and the position is, therefore, one of unstable equilibrium.

In conclusion, I have only to say that the "simple formula," which "Nauticus" recommends as so useful, is nothing more than that for the moment of inertia of the plane of flotation when the body is prismatic, and is one with which every one who has made the slightest attempt to study naval architecture as a science must be perfectly familiar.

Yours, &c., W.

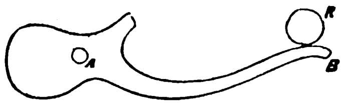
To the Editors of the Mechanics' Magazine.

GENTLEMEN,—The author from whom "Nauticus" makes his opening quotation in his letter on this subject can have, I should think, but a superficial knowledge of the laws to which floating bodies are subject. The principle which this quotation lays down, "Nauticus" has proved to be false. I propose to show how the error arises, and to point out the correct principle which should stand in its place.

It is quite true, when a body under the action of the force of gravity only is sustained by any *immoveable solid supports*, that it will assume a position in which the height of its centre of gravity is a minimum. The case of a floating body has been confounded with this, and the same principle

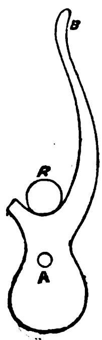
has been erroneously supposed to apply to both. With very little consideration, however, one may see that there is a very important distinction between the case of a body resting on immoveable supports and the case in which the body is capable of setting its own ponderable supports in motion. Take, for instance, the following, which is the best I can think of, to illustrate this point:—

Fig. 1.



A, B, represents a curved lever or bar pivoted at A. Fig. 1 represents this lever kept in equilibrium in a horizontal position by a small weight, R, in the form of a roller. The roller is shown as resting on the summit of the convex extremity of the arm, and is supposed exactly suited to balance the heavier end of the lever on the other side of the fulcrum. It is further supposed to have its centre in the same horizontal line with the pivot, A. Now, it will be readily perceived that the roller will be in a state of unstable equilibrium, and that if any slight force should set it moving towards A, the whole system would shortly assume the position represented in Fig. 2,

Fig. 2.



in which the roller, R, would attain a position of stable equilibrium. The result is, that the centre of gravity of the roller, R, is higher in its position of stable equilibrium than in any other. Hence it is evident that the law which governs the stability of a body resting on fixed supports does not hold when the supports are moveable. The law which does hold in all such cases requires a more general expression, and includes that already enunciated for fixed supports, which, indeed, is one of its particular cases. It is simply this:—the position of stable equilibrium of a body belonging to a system of bodies acted on by gravity is that position in which the height of the *centre of gravity of the whole system* is a minimum. This principle applies to the stability of floating bodies. The water on which the floating body rests is a moveable, and not a fixed, support. The true position of stable equilibrium, therefore, is that in which the common centre of gravity of the body and the water in which it floats is at a minimum height.

Suppose the weight of the body $= w$, the weight of the whole of the water in which the body floats $= W$, the height of the centre of gravity of the body above the surface $= h$, the depth of the centre of buoyancy below the surface $= d$, the depth of the centre of gravity of the whole body of water, if the hole made by the floating body were filled up with fluid, below the surface $= D$; then the depth of the common centre of gravity below the surface is—

$$\frac{(W + w) D - w h - w d}{W + w}$$

$$= D - \frac{w}{W + w} (h + d)$$

The law requires that this expression should be a maximum for a position of stable equilibrium. Now since D is a constant for all positions of the floating body while the fluid displaced is constant, therefore this expression is a maximum when

$$\frac{w}{W + w} (h + d) \text{ is a minimum, or}$$

when $h + d$ is a minimum; and $h + d$ represents the height of the centre of gravity of the floating body *above the centre of gravity of displacement.*

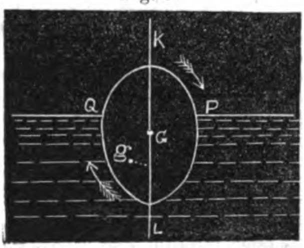
I do not pretend to prove the general principle in this letter, but only to show its correct mode of application to floating bodies. "Nauticus" will readily see that his prisms do not disobey this law. Take, for instance, his prism of cork in its two positions, and refer to the figures in his letter. In Fig. 4 the centre of gravity is ·1444 above the surface, and the centre of gravity of displacement is as much below; so that $h + d = {·2888}$. In Fig. 1 the centre of gravity is ·1727 above the surface, and that of displacement is only ·0512 below; so that $h + d = {·2239}$, which is less than before, as it should be.

Thus far I have nothing to object against the remarks of your correspondent. With his criticism of Professor Moseley's method of defining stability, however, I cannot

agree. "Nauticus" has quite misunderstood the meaning of the passage of the "Mechanics applied to the Arts," to which he refers. I will venture to transcribe the passage itself. It comes from page 291.

"Let either of the figures beneath represent a body partially immersed in a fluid. Let G be its centre of gravity, and g that of the part immersed; P Q the section of it, which would be made by the surface of the fluid, is there continued through it, and called the surface of *flotation*. Suppose the body to be turned about its centre of gravity, G, continually in the direction indicated by the curved arrows; and let it at the same time be moved up-

Fig. 3.



wards and downwards in the vertical K L, which passes through G, so as to satisfy, in all its positions, the first condition of equilibrium, namely, that its weight shall be equalled by that of the fluid it displaces. Suppose, further, this revolution to have been commenced when the body was in a position of equilibrium, and when the point, g, was, therefore, in the vertical K L. When the body begins to revolve out of this position, the point, g, will, of course, move out of the vertical. Now, if, as in fig. 3, its motion be *towards* the direction in which the body is revolving, it is clear that there will be a tendency in the body to continue its revolution in the direction in which it has already been made to revolve, that is, *from* its position of equilibrium; for the whole of the weight of the body may be supposed to act *downwards* at G, and the whole pressure of the fluid *upwards* at g: and these are the only forces which act upon the body; now, subjected to the action of these two forces, the body would clearly be made to revolve in the direction towards which it has already begun to revolve; that is, *from* its position of equilibrium; that position is, therefore, one of unstable equilibrium."

And so, *vice versâ*, if the new centre of buoyancy fall on the opposite side of the vertical through the centre of gravity of the body. The whole investigation seems to me most satisfactory.

"Nauticus's" mistake arises apparently from confounding motion of the centre of buoyancy, with regard to the floating body, with motion of the same point with regard to the fixed vertical.

Professor Moseley, when speaking of the motion of the centre of buoyancy, means the absolute motion of that point with regard to the fixed vertical line, K L. "Nauticus" interprets him to mean motion with respect to a line which moves with the revolving body. Professor Moseley's statement of the principles of stability amounts to precisely the same thing as the common statement in connection with the metacentre.

Yours, &c.,
A MECHANIC.

LONDON MECHANICS' INSTITUTION.

DR. LYON PLAYFAIR has been ordered to report on the state of the London Mechanics' Institution, founded in 1823, and the parent of the 600 similar institutions now existing in England. The number of members has dropped from 1,254 to 436, and the revenue has, of course, declined in proportion. Last year there was a deficiency of 204*l*., and in 1856 one of 177*l*. Dr. Playfair's report is a virtual condemnation of the Institution in its present state. He says it cannot be improved, the classes are cumbrous and inefficient, and a return of the pupils shows how little the real character of a mechanics' institution is comprehended in the classes held in it. The *curriculum* chiefly includes arithmetic and mathematics, drawing, French, writing, elocution, and music (the violin included), and the programme of the lectures is disjointed and devoid of system. The Institution is further encumbered with a debt of 4,000*l*. This must be paid, says Dr. Playfair, and other financial arrangements made. The Government will be asked (as the Committee propose) to give one-half of a sum (or 4,050*l*.) required to place the premises in free possession of the managers, the remainder to be collected by subscription. The question then arises whether the Institution, thus cleared of debt and reorganized, could become self-supporting. The answer is in the negative, and some external means of support must therefore be sought. These, Dr. Playfair thinks, may consist of subscriptions from the wealthy or of State aid. The report is addressed to Earl Granville, K.G., late President of the Council, and was moved for by Mr. Cox, M.P.

DRILL-PREVENTIVE IRON SAFES.

In our Magazine for February 20, of the present year, we drew attention in our article on "Scientific Burglary" to an invention of Messrs. Chubb, designed to prevent burglars from boring through the doors of iron safes, which invention has been patented, the patent having been completed so late as last week. In consequence of our remarks upon this subject, Mr. Price, the iron safe manufacturer of Wolverhampton, has drawn our attention to certain facts which raise the question of priority of invention, and of the designation "drill-preventive" in connexion with the improvement referred to. Without going minutely into the matter, it will be sufficient to say that Mr. Price claims to have been the first to apply the term "drill-preventive" to safes, and the first to render them really so, the latter being effected by his process of case-hardening the doors according to his patent dated 31st Jan., 1855. He further contends that a burglar might bore a small hole between the studs used by Messrs. Chubb, and then introduce powder into the lock, and open it by explosion; while every safe sent from his works since August, 1857, has had the lock entirely covered by a concealed plate of chilled metal, through which no drills can possibly penetrate. We have no desire to interfere needlessly with questions of this kind; but, at the same time, we see no reason for refusing to present the claims which the respective manufacturers may feel it desirable to make public.

YELLOW METAL FASTENINGS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—I beg to call your attention to the correspondence on the subject of Yellow Metal Fastenings in the *Mining Journal*, *Artizan*, and *Scientific American*, in the early part of 1855, as sufficient evidence that an immediate investigation of the trustworthiness of the material as a fastening for vessels is imperatively demanded. Since that time, in the repairing of vessels that have been bolted with the material for *five years*, I have observed in every instance, without exception, that the metal has completely lost its ductility and tenacity, and is, therefore, totally unfit for the bolting of vessels.

At various times I have personally called the attention of Lloyd's surveyors to the subject, but still vessels are classed A 1, 13 years, while I can safely assert from experience that four years is amply sufficient to complete the destruction of its ductility.

However slow the Admiralty of this country are to adopt new inventions, &c., it is highly creditable to the officers connected with it that they still retain pure copper in preference to such a treacherous material (it is only when broken that the great internal change can be observed, having more the appearance of *brown earthenware* than a metal), and is a proof that its advantages (economy) are not appreciated in the navy.

I trust now, with the help of your powerful periodical, for the sake of humanity, that some better result than the mere discussion of 1855 will now be obtained.

I am, Gentlemen,
Your obedient servant,
Robert Armstrong.

P.S. The whole of the discussion referred to is to be found in the first five numbers of the *Artizan* for 1855.

FIRE ESCAPES.

To the Editors of the Mechanics' Magazine.

Gentlemen,—It strikes me that if a strong board, with a hand-rail to it, were kept in every house, it might afford a means of escape in case of fire. Each end should have a hook or other contrivance, by which it might be hung or fastened, one end to a window in the burning house, and the other to the window of the adjoining house, and thus form a *temporary* bridge or balcony by which persons might easily go from one house to the other. Of course it would be kept *in* the room when not wanted. Should you think this idea worthy of notice, perhaps you will give it a place in your valuable journal, and some of your ingenious readers will readily hit upon some simple plan for carrying it into practice.

The objection to double doors between houses might be obviated by having them *bolted* instead of *locked*, and a string put through a hole in the bolt and a staple in the door-post, and then *sealed*. This would show if the door had or had not been *improperly* opened, and would readily give way in case of fire.

Sometimes lower rooms may be on fire, when the inmates above know nothing of it till too late. If a common twopenny *cracker* were hung in any room it would, in case of fire, soon be ignited, and, by its numerous explosions alarm the inhabitants, if not the police, and thus save life.

I am, Sir, yours, &c.,
A Poor Man.

London, April 3.

ON A CASE IN THE STRENGTH OF MATERIALS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Useful results have often arisen from observations apparently frivolous.

If any of your readers have arrived at a time, when the crusts they were accustomed to master with facility have become things too hard for them, and therefore to be let alone, they will be surprised at the effect of the following process. Cut out as much as possible of the leathery part which is next to the flinty outside, and both will be consumable with extraordinary ease.

It will be said there is nothing strange in the discovery, that by division a substance is weakened. But what was desired to be put forward was, that the weakening of the harder portion was greater than would have been inferred from the quality of the portion removed; and conversely, that the strength given to what may be denominated a hard substance, by being backed or supported by close union with a substance of less positive resistance, will be greater than would have been expected from consideration of the strength of each separately.

What occurs on the moment is, that this might be applicable to iron coating intended to resist the effects of shot, and that the strength of iron in close union with wood might be found unexpectedly great. But there may easily be other cases.

I am, Gentlemen,

Yours very sincerely,

T. PERRONET THOMPSON.

Eliot Vale, Blackheath, April 7, 1858.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

ROWAN, W. *Improvements in steam boilers and furnace flues.* Dated July 2, 1857. (No. 1850.)

This invention was described and illustrated at page 601, No. 1794, Vol. 67.

MEEUS, J. B. *An improved method of multiplying motive power and transmitting it to a shaft or other mechanism.* Dated July 2, 1857. (No. 1852.)

Here the patentee employs levers jointed together as lazy tongs, one end of which is attached to, or acted upon by, the motive power, and the other is connected to the mechanism to be driven. These "lazy tongs" may be kept extended by counterweights, so that when closed by the motive power they shall have a tendency to resume their extended position, and thus require very little power to work them.

LOCKETT, J., and W. WATSON. *Improvements in machinery for engraving or tracing designs on cylindrical or other surfaces for printing calico and other materials.* Dated July 3, 1857. (No. 1853.)

These improvements cannot be described without engravings.

CLARK, M. *Improvements in the preparation of cloth for Turkey-red dyeing.* Dated July 3, 1857. (No. 1854.)

The patentee dries the cloth by passing it near to the outer surfaces of chests, tubes, &c., containing steam. When it is required to dilute and rapidly carry away the vapours disengaged from the cloth by the action of the heat, he effects that object by producing a current of air between the surfaces of the steam passages and of the cloth.

CROLL, A. A. *Improvements in the treatment of liquors containing combinations of sulphur with ammonia.* Dated July 3, 1857. (No. 1855.)

These consist in forming the saturating vessels closed, and in applying thereto a pipe in connexion with a purifying vessel, containing oxide of iron, by which the deleterious gas is at once conducted from the saturating vessel to the purifier, and becomes absorbed or deprived of the deleterious influence.

MEARS, H. D., and W. HOULTON, jun. *An improved seal for railway luggage vans and for other purposes.* Dated July 3, 1857. (No. 1859.)

This consists in the employment of impressible metallic discs for receiving and holding fast the ends of a wire strip, &c., the said discs being made to grasp firmly each other, or any intervening or inserted substances, by compression produced by a blow from a die, which blow at the same time fixes upon the die, to which is applied an inscription or seal.

HENDRY, W. T., and R. H. HANCOCK. *Improvements in the manufacture of flexible tubes or hose-pipes.* Dated July 3, 1857. (No. 1861.)

The patentees take a flexible tube manufactured from a fibrous material, and saturate it with a solution of india-rubber or gutta-percha. They then take another tube composed of, say, india-rubber, and draw it through the first-mentioned tube. One or more woven tubes may thus be drawn through each other, to increase the strength if necessary. One end of the compound tube is now closed tight. They then fill the tube with water, steam, or air, or with sand, at a sufficient pressure to unite firmly the india-rubber tube to the woven or outer flexible tube or tubes. Other

modifications are included in this invention.

AGAR, J. and W. *Improvements in watches and keys for the same.* Dated July 3, 1857. (No. 1862.)

This consists in the construction of watches in which, by dispensing with the chain and fusee heretofore in use, and substituting a going barrel, the risk to the main spring and other parts of the machinery, arising from the great liability of the chain to fracture, may be avoided. They also employ, in connexion with the going barrel, an improved ratchet key, to prevent the occurrence of accident from winding in the wrong direction. They also protect the spiral spring from rust and dirt.

ROYDS, T., T. ROSCOW, and J. LORD. *Improvements in lifting heavy bodies under certain circumstances, such as minerals or other substances from mines to the surface of the earth, or from one story on an edifice to another, and in machinery or apparatus to be used for such purposes.* Dated July 3, 1857. (No. 1863.)

This invention consists in raising weights by attaching the same to a moveable nut, or barrel, formed with an internal screw answering to an external screw upon a fixed vertical shaft passing through the nut or barrel. The screw or shaft being put in motion round its axis, whilst the nut or cylinder is prevented from revolving, the latter, together with the attached load, is compelled to move in a line parallel with the axis of the shaft.

COOPER, G. *Improvements in safety lamps.* Dated July 4, 1857. (No. 1867.)

The invention was described at p. 324 of our last No.

SMITH, J. *Improvements in flour-dressing machines.* Dated July 4, 1857. (No. 1870.)

The patentee makes the gear wheels whole, and not fixed to the cylinder, but with a flange cast on one side for the two half cylinders to rest upon, and to which he secures the same by screw bolts at each edge or jointing, the wheels being constructed to work in the framing. The cylinder can thus be removed or replaced at pleasure without removing the gear wheels. The invention also refers to the brushes for cleansing the outside of the cylinder.

BOWDEN, T. *Improvements in apparatus for discharging the water resulting from the condensing of steam used in apparatus heated by steam.* Dated July 6, 1857. (No. 1871.)

Here a chamber is used, which may be called the discharge chamber, and according to one arrangement there is a partition on the inside, which divides it into two compartments. In this partition there are two holes, to which are applied two valves, attached to the two ends of a lever, the fulcrum being between the valves. On the stem of one of the valves is a float, and on the other end of such stem is a second valve for closing the outlet from the chamber. This valve is pressed on by a spring with a tendency to open it. On steam being admitted into the chamber it opens one of the valves which is carried by the lever, and by so doing closes the other valve on the same stem which stops the water outlet from the chamber; when the water accumulates it will raise the float, and cause the water outlet to be opened.

MUNT, W. *A shank to be attached to all descriptions of buttons, to be called an eyelot shank.* Dated July 6, 1857. (No. 1872.)

This shank is made of metal, with a head on one end to be inserted in the button, or made fast thereto. On the other end is an eyelot, either attached to, or made entire with, the stem, which, by being passed through the material to which the button is required to be made fast, and clenched over a washer of metal, is rendered secure.

HILLS, F. C. *Improvements in the manufacture of sulphuric acid.* Dated July 6, 1857. (No. 1873.)

The patentee claims, 1st, the use of the oxide of iron material, which has been used for the purification of coal gas, to furnish the sulphur required in the manufacture of sulphuric acid. 2. The mode of burning off the sulphur from the oxide of iron material, for the manufacture of sulphuric acid as aforesaid, in a furnace having a series of shelves ranged one above another to receive the oxide of iron material in thin strata, and which shelves are to be kept red hot with a communication from them to the condensing chamber, and also having apertures with regulators for the admission of air to the shelves.

FAULKNER, C. and D. *Improvements in gun and pistol barrels, and in cannons, and in furnaces for the same.* Dated July 7, 1857. (No. 1874.)

This relates to the manufacture of twisted gun and pistol barrels and cannons, and consists, 1st, in rolling the coil of twisted iron through grooved rolls on a mandril, the head of which is enlarged so as to compress the joints of the coil as the coil is forced over it by the action of the rolls. 2. In welding such barrels by means of a hammer, having inserted in it either a flat face combined with, so as to act upon, an anvil with a V-die contained in it, or a Λ (inverted V) die combined with it so as to

act upon the same. 3. In adapting to the furnace a closed chamber, or recess opposite to each hole through which the iron to be heated is introduced, so as to admit of that portion of the iron which passes into it remaining cool, or not subject to the action of the heat of the furnace, so that only the required portion of the iron is heated.

ALISON, J. *Improvements in preparing vegetable substances for feeding animals, and in apparatus for that purpose.* Dated July 7, 1857. (No. 1875.)

This consists in cutting vegetable substances into chaff while in the green state instead of when dry. The cutting apparatus employed consists of a series of circular cutters on a longitudinal shaft in contact with a second series of cutters. The cut grass falls between the cutters into an apartment beneath, and is carried thence by an endless chain of buckets up into an apartment over the kiln to be dried.

BADGE, R. J. *Improvements in railway chairs.* Dated July 7, 1857. (No. 1878.)

The patentee adopts an arrangement of parts which is designed to give a strong vertical support both in the sleeper and the joint chair, thereby strengthening the joints or weakest part of the rails, by distributing the strength of the metal so as to bear on every part an equal degree of solidity, and thus prevent injurious deflection at the joints of the rails when the trains pass over them. He also fixes the nuts by notches and wedges.

BOUSFIELD, F. *Improvements in the manufacture of soap.* Dated July 7, 1857. (No. 1880.)

This consists in adding animal or vegetable fibre, or fibrous substances insoluble in water, reduced to shreds or fine cuttings, to soap, for increasing its cleansing powers.

FONTAINEMOREAU, P. A. L. DE. *Certain improvements in apparatus for the manufacture of boots and shoes, which apparatus is also applicable for uniting other articles together.* (A communication.) Dated July 7, 1857. (No. 1882.)

This consists, 1st, in the use of a tubular screw for forming and fixing the screw rivets. 2. In a mode of obtaining a great pressure on the leathers, sail cloth, &c. 3. In means for making the thread of the screw of the required depth. 4. In cutting the screw triangularly so as to form a rivet in the interior. 5. In a tool to be fixed to a lathe for making the screw thread separately, and of the required size.

BERARD, P. H. G. *Improvements in manufacturing azotic cotton or pyroxile for photographic and other purposes.* Dated July 7, 1857. (No. 1883.)

The cotton which the patentee uses for his process is that obtained from the shearings of swanskins. He mixes together half a pound of sheared cotton with two pounds and six ounces of powdered saltpetre, or azotate of potash, in a very dry state. The specification of this invention must be consulted for the numerous details included therein.

BERARD, P. H. G. *Improvements in manufacturing and applying concentrated collodion.* Dated July 7, 1857. (No. 1884.)

The collodion which the patentee uses in manufacturing artificial flowers, and for waterproofing stuffs, is obtained by dissolving in a cold state and in closed vessels, azotic cotton, either in ether alone, or mixed with alcohol.

SMITH, W. *Improvements in horse hoes and drills.* Dated July 7, 1857. (No. 1886.)

The object here is to render the hoes of horse hoes and the coulters of drills capable of self-adjustment to suit sloping ground on the hill side, and thus insure the proper action of the hoes, or of the coulters, as the case may be.

BROOMAN, R. A. *Improvements in vices.* (A communication.) Dated July 7, 1857. (No. 1888.)

This invention was described and illustrated at p. 148 of No. 1801, of this Magazine.

BURGESS, W. *Improvements in reaping and mowing machines.* Dated July 7, 1857. (No. 1889.)

The object here is to effect a separation between the cut crop and that which is left standing, and to deliver the cut crop on or towards the platform of the machine. On that side of the machine which travels close to the standing crop, is a revolving divider, in the form of a cone or conical-shaped barrel, furnished or not with a screw vane, or vanes, over the whole, or part of the length thereof. The apex or point of the cone or barrel is placed towards the front of the machine, and in advance of the knife. It also consists in constructing the divider boards in reaping and mowing machines, for cutting certain crops, so that part thereof may be removed over the end of the finger beam, or may be formed with a moveable flap. The patentee constructs the reel vanes so that they may be made to expand and contract in the direction of their length, for enabling the vanes to pass as near as may be to the fingers, and thus draw short crops on to the platform.

HENRY, M. *Improvements in railways and wagons used therewith, in loading and discharging coals, stones, ballast, earth, and other materials.* (A communication.) Dated July 7, 1857. (No. 1891.)

The chief object here is to afford means for the passing of railway wagons from one line of rails to another without turntables, and for their being loaded and discharging their contents at any required point with increased facility.

JONES, W. E. *An improvement in trees of riding saddles.* Dated July 8, 1857. (No. 1892.)

This consists—1st, in affording the tree capability of being made wider or narrower, so as to adapt itself to horses of different sizes. 2. In its being lighter and more durable than the ordinary saddle tree. 3. In that the pressure on the saddle will cause the side pieces to be flat on the horse. The improved trees cannot be described without engravings.

PITMAN, J.T. *A conical tent.* (A communication.) Dated July 8, 1857. (No. 1893.)

This invention cannot be described without engravings.

GREEN, G. *Improvements in machinery for the manufacture of casks, barrels, and other similar articles.* Dated July 8, 1857. (No. 1894.)

This refers to the different operations necessary for sawing, jointing, and backing the staves, sawing, fitting, and turning the heads, and splaying the iron hoops. The length of the specification will not admit of our describing this invention in detail.

HENLEY, T. F. *Improvements in the preparation or manufacture of certain beverages or liquors of the nature and character of home-made wines, and in the means of obtaining the same.* Dated July 8, 1857. (No. 1895.)

This consists in the use of rice in the preparation of certain liquors of the nature of home-made wines.

BRANCHON, J. J. H. *Improvements in colouring and ornamenting glass, porcelain, earthenware, and other ceramic substances.* Dated July 8, 1857. (No. 1896.)

Here the object is to impart to ceramic substances the colour of gold, white, and coloured mother-of-pearl-variegated and changing reflections of shells, of all kinds of minerals, and of the optical prism. It consists in the preparation and use of chemical products, composed principally of carburets of hydrogen and of metallic salts, which, when submitted to the heat of a suitable furnace or oven, possess a splendour and metallic brilliancy comparable to that of mirrors, and of such solidity that the colours have the appearance of being under enamel.

GIBBS, J. *Improvements in extracting gold and silver from their matrices and from other substances, or materials with which they are combined, mixed or associated.* Dated July 8, 1857. (No. 1897.)

This consists chiefly—1st, in washing through sieves the diluvial sands and gravels of the geologists, so as to obtain about one-thirtieth part of the original bulk after such bulk has been freed from the large stones and pebbles, which process the patentee calls concentrating. 2. In regrinding this material so concentrated, and which contains the metallic particles, the second crushing machine being at the same time charged with quicksilver, and he causes the concentrated material, whether crushed or ground rock (first being concentrated), or concentrated diluvial sands or gravel to be ground fine, that it shall, while passing and repassing over the surface of the quicksilver, resemble mud, and for the more perfect grinding, and to carry off the muddy substances when so formed, he causes water to flow through the crushing machine. Nitre is sometimes added to the materials during the crushing.

CUMMINS, N. M. *Improved means for indicating the proximity of icebergs.* (A communication.) Dated July 8, 1857. (No. 1902.)

This refers to a method of testing the temperature of the water. The patentee adapts to the ship a self-indicating apparatus, and conducts the water thereto in a continuous stream, so that either on inspection or by an audible signal the dangerous proximity of icebergs will be made known.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

WOODWORTH, C. W. *Improvements applicable to capstans and other like purchases.* (A communication.) Dated July 3, 1857. (No. 1851.)

Upon a stationary upright shaft a capstan barrel is mounted, and on its lower edge there are pawls, arranged in pairs, two upon one axle, and on the same axle is a T-shaped piece of metal, which keeps them apart, and partially extended in opposite directions. On the deck is a series of notches or teeth, into which the pawls can take. Upon moving the T-piece one of the pawls is lifted up, and the other falls to the notched circle. By reversing the position the pawl in gear is relieved, and the reverse pawl brought into play. The lower limbs of the T-pieces are connected so that, by a short lever, the whole of the pawls can be thrown out of gear, and the barrel be free to rotate in either direction. The barrel is worked by driving shafts, placed immediately below the capstan head, which is a

fixture on the top of the shaft upon which the barrel revolves. On the driving shafts toothed wheels are mounted (one for quick and one for slow motion), and work into toothed circles on the head of the capstan barrel.

TOPHAM, C. *An improved apparatus for raising and forcing liquids.* Dated July 3, 1857. (No. 1856.)

The inventor makes a box with a recess in the top, bottom, and side thereof to receive packing on all the four sides, and round the holes for the bearing of a plunger, which is a portion of a circle with a bearing projecting on each side, so that the plunger when fitted in the box presses against the packing fitted in the recess all round the box, making the plunger perfectly tight. This plunger, being worked round in the bearings, will raise and force liquids in the ordinary manner.

FORDRED, J. *Improvements in treating and purifying water.* Dated July 3, 1857. (No. 1858.)

This consists in the use of carbonate of lime and sulphate of lime, both natural and artificial. Either of these may be applied by itself, or the two may be mixed with the water, and then allowed to subside; or they may be used as filtering media singly or combined, alone or in addition to the substances usually employed for that purpose.

GARDNER, J. E. *Improvements in illuminated clocks, and in apparatus employed for lighting the same.* Dated July 3, 1857. (No. 1860.)

This consists, 1st, in forming the dials of illuminated clocks of a semi-opaque glass. 2d. In regulating the gas supplied to the burners of illuminated clocks by means of an ordinary dry regulator constructed with a cover which serves to receive any gas which may escape, and with a pipe for conveying such gas to the exterior of the building in which the gas is used. 3d. In measuring the gas supplied to such burners by means of dry meters, in which the valves are moved by a drawing or pulling action only, and in which the diaphragms are carried by a moveable arm or spindle so centred that the flexible materials which connect the valves with the sides of the meters may with certainty be spread to their full extent, in order that the gas consumed may be measured with accuracy.

GIBSON, R. and S., and J. GASCOIGNE. *Improvements in boilers for generating steam.* Dated July 4, 1857. (No. 1864.)

This boiler has the fire underneath, with a large aperture ascending from the grate upwards through the lower part of the boiler to a large chamber in the midst of the boiler, into which the draught from the fire will force the heated air. This chamber is traversed by water tubes, and tubes from the chamber pass through the boiler, and carry off the heated air from the chamber into a flue, by which the heated air is carried twice round the boiler, and discharged into the chimney. The divisions of the fluid consist of spaces filled with water, and the bridge by which the heated air is driven from the grate into the large chamber also consists of a space filled with water. The main object is to get a large extent of heating surface in contact with the water.

HENRY, M. *Improvements in machinery or apparatus for cutting vegetable substances.* (A communication.) Dated July 4, 1857. (No. 1865.)

Here the substances to be cut have a centrifugal movement towards the cutters. A conical drum furnished with cutters, supplied with the substances to be cut, is caused to rotate. The cutters inside the drum are fitted in slots in the sides, and with screws or pins working in oval or other shaped holes to enable them to be adjusted or removed. The substances have a centrifugal movement towards the cutters, and are, to any desirable extent, kept from revolving with the drum by stationary abutments.

HENRY, M. *An improved machine for cleaning and crushing grain.* (A communication.) Dated July 4, 1857. (No. 1866.)

This consists of a machine in which the grain has first its germ and husk broken by the action of a feed roller, and is thence brought on to a series of sieves or riddles to which an alternating motion is communicated, by which it is separated from foreign matters and impurities, and also from the husk and germ, and is finally conducted to crushing rollers, which reduce it to grit or meal.

GRANTHAM, J., and H. SHARP. *Improvements in working the valves of steam engines.* Dated July 4, 1857. (No. 1868.)

It is proposed to work a counter shaft parallel to the main shaft by means of spur wheels. This shaft will be so situated as to be easily connected to the rods which work the valves, and on it will be placed the usual eccentrics, cams, or cranks to give motion to the valve rods, and also the wheel through which it will receive motion from the main shaft. Other modifications are included.

MILLS, J. *An improved method of covering ricks, booths, tents, and such like places.* Dated July 4, 1857. (No. 1869.)

This consists in arranging and mounting

coverings for ricks, booths, tents, &c., on beams or rollers, in a nearly similar manner to that of mounting roller window blinds, and in raising and lowering them by ropes or chains passed over suitable supports, by means of a winch or other power.

DAWES, W. *Improvements in the pistons of steam engines.* Dated July 7, 1857. (No. 1876.)

This consists in constructing such pistons so as to neutralise the effect of the pressure of the steam upon the edges thereof—that is to say, upon the outer or fixed ring or covering plate on each side of the piston, so that the pressure shall not be on one half only of the circumference of the said rings, but all round them.

CANIG, W. A. Von. *A new or improved compound or composition to be used as a substitute for gum, paste, and other adhesive materials, and for finishing, sizing or stiffening fabrics and other articles to which the same is or may be applicable.* Dated July 7, 1857. (No. 1877.)

The inventor takes the plant called carragheen, or Irish moss, and after sorting it dries it by heat, reduces it to powder, and bleaches it. He mixes the powdered plant with an equal quantity of starch, or flour of rye, corn, acorns, or chesnut; the quantities may be varied.

PLATT, J. *Improvements in gun-locks.* Dated July 7, 1857. (No. 1879.)

Here the lock consists of the plate which fastens it to the gun. Upon the outer side of the plate is fastened the cock, and parallel to it, but on the opposite side of the plate, is an eccentric, or cam, so connected with the cock, that when the latter revolves the former turns with it, and *vice versâ.* Upon the periphery of the eccentric are two notches into which the lever of the trigger slides, and holds it at half or full cock; on another part of the periphery of the eccentric is an indent, into which one end of one of the legs of a forked spring works, the other leg of the spring pressing against the lever of the trigger, while the extremity of the spring from which the legs branch is firmly fixed at or near the end of the plate.

SPEIGHT, J. *Improvements in wool combing, and in machines known as "Collier's combing machines."* Dated July 7, 1857. (No. 1881.)

This consists, 1st, in preparing the wool so as to make it into a sliver or sheet before feeding it on to the comb of the machine known as "Collier's wool combing machine," instead of feeding it on in the staple or lock. The improvements in the machines consist, 1st, in providing such machines with an apparatus for feeding or donning the sliver or sheet of wool on to the comb. 2d. In employing an additional pair of drawing rollers for doffing.

JULLION, J. L. *The mechanical and chemical separation of solids from fluids.* Dated July 7, 1857. (No. 1885.)

The object here is accomplished in the case of substances held in mechanical suspension by a self-discharging filter consisting of two endless bands of cloth travelling on or with grooved surfaces, or on a surface of rollers, placed so as to receive the pressure; in either case the inventor forces the liquid between the cloth by means of pumps, or otherwise.

BROOMAN, R. A. *The manufacture upon circular frames of a fabric suitable for petticoats and other garments, curtains, and other articles of furniture.* (A communication.) Dated July 7, 1857. (No. 1887.)

The object here is the manufacturing upon circular looms of knitted petticoats, or knitted fabrics with sheaths, bands, or stripes in plain or close knitting to form slides or cases for the introduction of strips of steel, whalebone, cane, or other stiffening agent.

BROOMAN, R. A. *Improvements in connecting carriages and wagons on railways.* (A communication.) Dated July 7, 1857. (No. 1890.)

This consists in certain transverse connexions for preventing the oscillation of trains in motion by establishing a rigid connexion laterally throughout the train, and in providing additional longitudinal couplings.

NISSEN, H. N. *An improved method of making impressions similar to water-marks upon paper.* Dated July 8, 1857. (No. 1898.)

This consists in taking paper after it comes from the mill, in damping it to such an extent as will not deprive it of its size, and in subjecting it to pressure under metal letters or devices in an ordinary printing press; but to obtain a perfect and lasting impression, the inventor removes the tympan, and thus the paper is exposed to the metal device on one surface, while the other surface is in contact with the platten or with the cylinder.

BELLHOUSE, E. T., and W. J. DORNING. *Certain improvements in hydraulic presses.* Dated July 8, 1857. (No. 1899.)

This relates, 1st, to the use of a spindle or rod, without seating, to act as safety valves; the spindle passing through leather, &c., is kept water tight, and when the pressure of the water becomes greater than the regulating weight, the self-acting valve lifts the lever and throws the pumps out of gear. 2d. It relates to stopping and start-

ing the pumps by means of a cam or tumbler having two flat surfaces or faces formed thereon.

BAHN, L. A. *Improvements in the manufacture and application of certain metallic alloys.* Dated July 8, 1857. (No. 1900.)

This consists in the application to the sheathing for ships of boiler plates, tubes, &c., of metallic alloys composed of copper, tin, and spelter, the articles manufactured from these alloys being afterwards galvanised.

BAHN, L. A. *Improvements in galvanizing metals, and in the apparatus employed therein.* Dated July 8, 1857. (No. 1901.)

Here, after the metal to be galvanized has been passed through the ordinary acid baths, it is immersed in the spelter bath, which is kept in a state of gentle agitation. In place of using sal ammoniac on the top of the bath, the inventor employs resinous and fatty matter for preventing oxidation. By this means he is enabled to prevent the formation of dross or muriate and ammoniac of zinc. For introducing wire or bars of metal into the bath from the sides or bottom, he employs suitable stop cocks fitted with funnel mouths.

MOORE, R. *Improvements applicable to navigable vessels and the propelling thereof.* Dated July 8, 1857. (No. 1903.)

This relates, 1st, to the strengthening:—The inventor employs tubular metallic kelsons of a cylindrical, oval, elliptical, or spheroidal section, secured longitudinally upon the frames or floors of the ship. Also to corrugated iron and cast-iron braces for longitudinal and transverse bulk heads, and to a fastening which he calls a topside bracing, consisting of an angle iron under the knees for the whole or part of the sheer, and some or all of the knees are secured by being in part formed so as to be rivetted to this angle iron. 2d. To the appliances for the advantageous development and economy of steam, when used as a motive power. Here he partially lowers and raises the shaft and screw, to vary the elevation of the axis of rotation, for working in deep or shallow water. 3d. To the detection of local attraction.

DOBSON, A. *Improvements in machinery or apparatus to be used in bleaching, washing, starching, airing, and finishing fabrics, and in sizeing yarns.* Dated July 9, 1857. (No. 1904.)

This invention, so far as it relates to bleaching, consists, 1st, in the use of circular rubbers, which the inventor radially or otherwise serrates and mounts on a vertical axis, to which he communicates any required parts of a revolution in one direction, whilst the lower rubber on which the cloth rests is either stationary or moveable in an opposite direction. 2. It relates to wash mills, where, by the introduction of drawing and delivering rollers in the sides of the lower front timbers of the mill frame, and an arrangement for preventing the loss of water. He makes the mills a continuous washing machine, so that all the labour required is to knot or attach the ends of pieces to each other, the cloth being taken into the box washed, and delivered in a squeezed or dried state. 3. It refers to a dash or bleaching wheel. The improvements in starching and airing apparatus consist in placing an endless web or sheet over rollers, and between two bowls, the lower of which imparts starch or size to the outer surface of the web. The airing apparatus consists of a frame containing drawing and delivering rollers, through which the fabric is continuously passed from the starching machine. This frame is moved to and fro by an eccentric, so that the cloth being stretched in the frame is, by this moving about, dried by the air, finding its way through the interstices of the cloth. The inventor also proposes to use a wire cylinder containing a fan as a means of airing. The improvements in finishing fabrics consist in providing a two bowled mangle, with levers, which shall, as the bowls are gradually parted or elevated, gradually lift or become subject to pressure of additional weights, and entering two pieces of cloth into the nip of the bowls, and allowing the upper piece to wrap on the upper, and the lower from the lower bowls of the mangle.

PROVISIONAL PROTECTIONS.

Dated December 1, 1858.

2982. James Young, of Glasgow, manufacturing chemist. Improvements in measuring liquids.

Dated February 16, 1858.

292. Robert Anderson and John James Prescott, of Duke-street, Liverpool, brass founders. Improvements in lubricators.

Dated February 18, 1858.

306. John Piddington, of Brussels. Improvements in the manufacture of fuel, commonly called artificial or patent fuel.

Dated February 20, 1858.

328. Thomas Metcalf, of Newton Heath, Manchester, manufacturing chemist. Improvements in the purification of crude tar oil, rendering the same suitable for lubricating machinery and other similar purposes.

Dated March 3, 1858.

420. James Gowing, of Poplar, engineer, and Henry Bull, of Greenwich, engineer. Improvements in apparatus for preventing smoke, applicable to tubular boilers.

Dated March 9, 1858.

478. Ferdinand Charles Warlich, of Gloucester-place, Kentish-town. Improvements in apparatus for generating steam.

Dated March 11, 1858.

490. Arthur Jones Holdsworth, of Leeds, gentleman. A safety railway oral communication.

492. George Tomlinson Bousfield, of Loughborough Park, Brixton. Improvements in knitting machines. A communication.

494. John Dickinson Leathart, of the Lead Works, Newcastle-on-Tyne. Improvements in furnaces.

Dated March 12, 1858.

496. Alexander Porecky, of York-street North, Hackney-road. Improvements in the manufacture of the frames of umbrellas and parasols.

500. Thomas Thompson, of Radbourne, Derby, farmer. Improvements in vats for cheese-making.

502. William Pearson, of Brierley-hill, Stafford, cooper. A new or improved washing machine.

504. James Wright, of Alfred-place, Newington-causeway, civil engineer. Improvements in the treatment of machine-made malleable iron nails. A communication.

506. Alfred Vincent Newton, of Chancery-lane. A new combination of instruments for extracting teeth. A communication.

Dated March 13, 1858.

510. Christophe Tilliere, of Brussels, gentleman. Certain improvements in machinery for forging, planing, and stamping cold or heated metals.

512. George Pigott, of Nottingham, lace maker. Improvements in Jacquard machinery for figuring lace and other fabrics.

516. Alfred Vincent Newton, of Chancery-lane. Improved machinery for making horse-shoes. A communication.

Dated March 15, 1858.

518. John Cowdery Martin, of Charlewood-road, Putney, naval architect. An improved plastic compound for the manufacture of moulded articles, to be used as a substitute for wood carvings, and for many of the purposes to which papier mâché is applicable.

522. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., Editor of the *Mechanics' Magazine* and Patent Agent. Improvements in sewing machines. A communication.

528. John Hamilton, jun., of Liverpool. Improvements in apparatus for propelling vessels.

530. John Fielding Empson, jun., of Birmingham, manufacturer. An improvement or improvements in ornamenting certain kinds of buttons.

Dated March 16, 1858.

532. Daniel Gallafent, of Stepney Causeway, engineer. Certain improvements in machinery or apparatus for cooling liquids and condensing vapours.

534. Michael Henry, of Fleet-street. Improvements in the manufacture or production of artificial marble frescoes and decorative ornamental and artistic surfaces, objects, and works. A communication from J. B. J. Lepers Brigy.

536. John Lawson, of the Hope Foundry, Leeds. Improvements in machinery used in spinning flax and other fibrous substances.

Dated March 17, 1858.

538. William Stettinius Clark, of the Atlas Works, Upper Park-place, Dorset-square. Improvements in machines for cutting and harvesting grain and grass crops. A communication from W. A. Wood, of New York.

539. Charles Fréderic Vasserot, of Essex-street, Strand. Improvements in the treatment of horn, and in the application of it when so treated as a substitute for whalebone in the manufacture of umbrellas, parasols, and similar objects. A communication from Messrs. E. Vivet and J. Floret, of Lyons.

540. Donald Nicoll, of Regent-street. Improvements in machinery for cutting out military, naval, and police uniforms, and other clothing.

541. William Todd and Jacob Todd, of Heywood, Lancaster, spinners. Certain improvements in power looms for weaving, and in shuttles to be employed therein.

543. John Gooderham, of Mathias-street, Kingsland, shoemaker. Improvements in shoemaker's wax.

544. William Clement Beatson, of Masbro', York, glass manufacturer. Improvements in apparatus to be used in the manufacture of glass bottles.

545. Thomas Chambers Hine, of Nottingham, architect. Improvements in lighting and ventilating by gas.

546. Thomas Evans, of Hanover-street, Islington, umbrella and parasol manufacturer. Improvements applicable to the manufacture of parasols.

547. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., Patent Agent. Improvements in the construction of boxes or cases for trees, flowers, and other horticultural and floricultural purposes. A communication from Victor Ferdinand Jeauneau.

548. William Ward, of Smethwick, Stafford, accountant clerk. New or improved machinery for the manufacture of nails, spikes, bolts, rivets, screw blanks, and nuts.

549. John Oxley, of Beverley, York, carriage-builder. An elastic cushion or fitting piece for windows, blinds, shutters, and doors, which is also applicable for other purposes.

Dated March 18, 1858.

551. Richard Glanville, of Bermondsey, engineer. Improvements in condensing steam engines.

553. James Webster, of Birmingham, engineer. Certain new or improved metallic alloys.

555. Andrew Dunlop, of Moor Park Mill, Renfrew, grain merchant, and Alexander Stark, of the same place, millwright. Improvements in dressing or sifting flour and meal or reduced grain.

557. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., Editor of the *Mechanics' Magazine* and Patent Agent. An improved knee cap. A communication from Louis Le Febvre.

559. Richard Townend and William Townend, of Bradford, York, musical instrument manufacturers. Improvements in piston valve musical instruments.

561. Alexander Angus Croll, of Coleman-street, City, engineer. Improvements in the manufacture of parts of dry gas meters.

Dated March 19, 1858.

563. Paul François Aerts, of Brussels, mechanical engineer. Improvements in the construction of railway rolling stock, and in the lubrication thereof, and other moving parts of machinery.

565. George Scott, of Manchester. Improvements in generating elastic fluids, and in apparatus for that purpose.

567. William Henry Rhodes, of Oldham, machinist. Improvements in speed indicators and calculators.

569. Thomas Charles Medwin, of Clayton-place, Kennington-road, engineer. Certain improvements in the construction of water gauges for steam boilers.

571. Daniel Evans, of Railway-terrace, Stratford. An improvement in apparatus for supplying air in streams to furnaces.

573. James Young, of Knaresboro', York, watchmaker. Improvements in chronometers, clocks, and watches.

Dated March 20, 1858.

575. Marc Antoine François Mennons, of Rue de l'Echiquier, Paris. Certain improvements in the piercing of tunnels. A communication.

579. Lambert Cowell, of Adelphi, gentleman. Improvements in machinery or apparatus for teaching the art of swimming.

581. Richard Mills, of Bury, Lancaster. Improvements in washing machines.

583. John Biggs and William Biggs, of Leicester, manufacturers. An improvement in the manufacture of polkas when looped or elastic fabrics are used.

585. Jules Le Franc, of Aldersgate-street. Improvements in pressure gauges. A communication from J. Rival, of Paris.

587. William Edward Newton, of Chancery-lane, civil engineer. An improved mode of treating and combining various combustible matters or substances for the production of artificial fuel. A communication from the Widow Couillard and Co., of Paris.

PATENT APPLIED FOR WITH COMPLETE SPECIFICATION.

648. Richard Williams, of Bishop's-road, Victoria Park. An improvement for manufacturing soap for cleansing, bleaching, and purifying purposes. Dated 27th March.

NOTICES OF INTENTION TO PROCEED.

(*From the* "*London Gazette*," *April* 6, 1858.)

2932. C. Barlow. Improvements in steam and air engines, and furnaces therefor. A communication.

2934. D. Hulett. Improvements in cocks, taps, and valves, and in joints for pipes and tubes.

2943. R. W. J. Abbott and D. Mills. Improvements in looms.

2956. W. B. Taylor. Improvements in driving looms for weaving.

2959. W. Elcock and S. Bentley. Improvements in elbows used for joining wrought iron and other pipes or tubes, and in tools for manufacturing the said elbows.

2967. W. Massey. Improvements in guides or conductors to be applied to machinery or apparatus employed for winding or coiling chains, ropes, lines, thread, wire, or other similar articles.

2982. J. Young. Improvements in measuring liquids.

2985. D. Lane. Improvements in lighting, regulating, and extinguishing street and other gas lamps by means of electricity.

3005. J. Buchanan. Improvements in smoke consuming apparatus, applicable to boiler and other furnaces.

3019. T. S. Adshead and A. Holden. An improved self-acting combination of machinery for the grinding of carding engine rollers.

3024. W. E. Newton. Certain improvements in apparatus for laying submarine telegraph cables. A communication.

3072. W. Little. Improvements in lamps.

3077. E. Breffit. Improvements in the manufacture of glass bottles.

3083. J. Thornton. Improvements in apparatus used for the manufacture of carpets and other cut pile fabrics.

3102. H. Johnson. Improvements in apparatus for drawing geometric curves.

3140. S. and D. Rodgett. An improved method of coupling and uncoupling railway, tramway, and other carriages, waggons, lorries, trucks, and other vehicles.

212. W. Rhodes and H. Napier. The production of a new paint oil.

357. G. A. Barrett, W. Exall, and C. J. Andrewes. An improvement in the manufacture of perforated beaters for thrashing machines.

376. J. E. Ryffel. The improvement of stoves for the purpose of warming rooms and baking bread, called the "Hygeian Stove."

467. T. Lyne. An improved harrow.

506. A. V. Newton. A new combination of instruments for extracting teeth. A communication.

512. G. Pigott. Improvements in jacquard machinery for figuring lace and other fabrics.

516. A. V. Newton. Improved machinery for making horse shoes. A communication.

518. J. C. Martin. An improved plastic compound for the manufacture of moulded articles, to be used as a substitute for wood carvings, and for many of the purposes to which papier maché is applicable.

527. J. S. Russell. Improvements in preserving the bottoms of iron ships and vessels.

555. A. Dunlop and A. Stark. Improvements in dressing or sifting flour and meal or reduced grain.

561. A. A. Croll. Improvements in the manufacture of parts of dry gas meters.

583. J. and W. Biggs. An improvement in the manufacture of polkas, when looped or elastic fabrics are used.

648. R. Williams. An improvement for manufacturing a soap for cleansing, bleaching, and purifying purposes.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

1853.

231. Richard Archibald Brooman.

1854.

1865. Joseph Henry Tuck.

1855.

418. Auguste Edouard Loradoux Bellford.
708. William Swain.
710. George H. Babcock and Asher M. Babcock.
729. Frederick Phillips.
736. William Lund and William Edward Hipkins.
737. François Theodore Botta.
742. Hiram Powers.
748. Henry Richardson Fanshawe and John Americus Fanshawe.
752. Christopher Nickels and James Hobson.
755. Louis Ambroise Michel Mouchel.

LIST OF SEALED PATENTS.

Sealed April 1*st*, 1858.

2523. James Murdoch Napier.
2527. Alfred and Henry Illingworth.
2529. John Swect Willway.
2537. William Riley and Thomas Riley.
2545. John Rubery.
2548. Robert Atkinson.

2555. Edward Cavendy.
2557. Richard Hugh Hughes.
2560. Richard Archibald Brooman.
2564. William Knapton.
2566. James Warburton.
2569. William Gossage.
2577. William Grindley Craig.
2585. George Scott.
2597. Claude Nicolas Leroy.
2650. Ward Holroyd and Samuel Smith.
2665. John James Sieber.
2693. Alexandre Henri Charles Chiandi.
2749. David Allison and John Livingston.
2773. Charles Clay.
3113. James Murdoch Napier.
110. Peter Wilson, Samuel Northall, and Thomas James.
213. Alexander Crichton and Matthew Whitehill.

Sealed April 6th, 1858.

2553. George Thomas Robinson.
2574. Thomas Grubb.
2609. William Henry Myers.
2628. Frederick Hale Holmes.
2635. William Ashby Rooke.
2649. John Wright.
3139. Arthur Challis Kennard.
166. James Wotherspoon.
192. John Gray.
252. John Chatterton.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICE TO CORRESPONDENTS.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

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Mechanics' Magazine.

No. 1810.] SATURDAY, APRIL 17, 1858. [PRICE 3D.

Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London.

DODDS' FURNACE FOR THE MANUFACTURE OF STEEL.

Fig. 1.

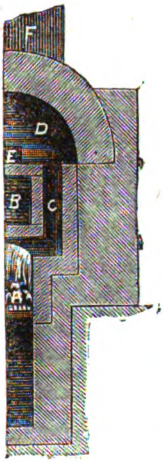


Fig. 2.

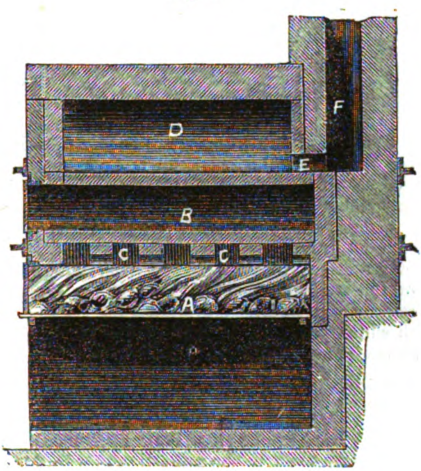


Fig. 3.

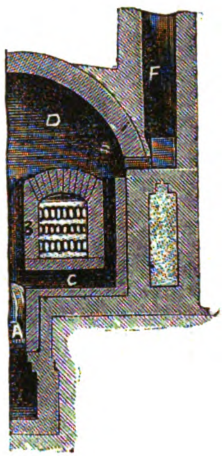
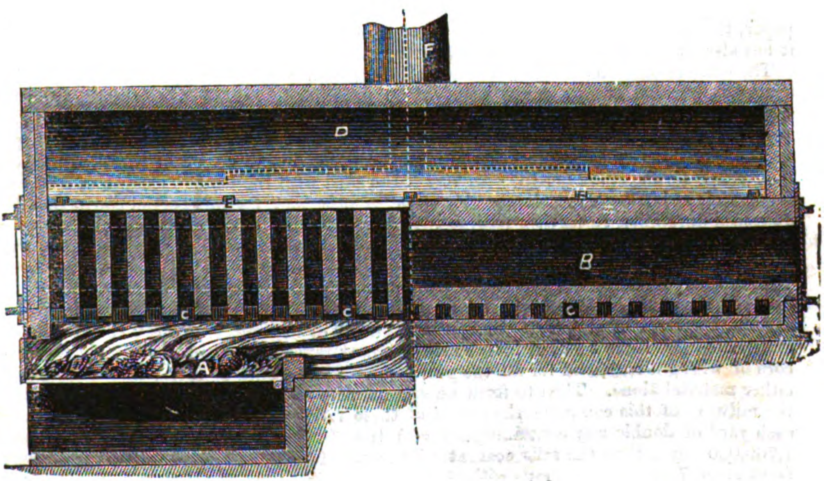


Fig. 4.



DODDS' IMPROVEMENTS IN THE MANUFACTURE OF STEEL.

BY T. W. DODDS, OF ROTHERHAM, BEING AN ABSTRACT OF A PAPER READ AT THE INSTITUTION OF MECHANICAL ENGINEERS.

The author of this paper, following out a series of experiments that were for several years carried on by his father, devised a converting steel furnace that admitted of being charged and drawn without interfering with the heat of combustion, or very slightly so, thus saving the time required in the old process of waiting for the cooling of the furnace down to a point that would enable the men to enter; also, by a modification in the chemical materials of conversion, he has been enabled to effect a more rapid action. The result obtained is that the firing, which in the old process was continued from seven to nine days, need not be kept up longer than from three to five days. The commercial advantages obtained were economy in coal of fifty per cent., and a much greater economy in time, without detracting in any degree from the quality.

The process for producing blister steel consists in covering the iron in the furnace with charcoal, mixed with a small portion of about six per cent. of lime and about two per cent. of alkaline matter, generally soda-ash, and then exposing the whole to the strong heat of a coal fire for seventy-five hours; the iron was then drawn from the furnace, which had been somewhat reduced in temperature, and the conversion was completed. It is to the arrangement of the furnace in such a form as will enable the iron to be placed and withdrawn for an indefinite number of charges with comparatively slight reductions of heat, that a considerable portion of the economy is due; for it is manifest that each furnace is thus rendered at least four times as productive as under the old or more usual process; and, besides the greater quantity of work that may be carried on within the same area of ground, it is only chargeable with one-fourth of the present amount of interest or fixed capital invested in furnaces.

It has been a great point often aimed at in the iron manufacture to increase the hardness and durability of the working surface. Perhaps the best recognised efforts are the chilling of cast-iron railway wheels, which produces on them a hard wearing surface, owing to the rapidity with which they are cooled. This is carried out to a great extent in the wheels used by railway contractors for the temporary earth wagons employed in the first construction, and was used for the locomotives and carriages of the earlier railways. Casehardening is a different process, which depends on chemical properties and action, the exterior surface being brought to a quality approaching to steel of a superficial nature. The next attempt was the welding of a bar of steel on the wearing surface of tyres; and other experiments were made in the same direction by Mr. Sidney Jessop, who, expending much time and money in various experiments, produced the further advance of submitting portions of the iron where hardness was essential, such as wheel tyres and rails, to the continued action of carbonising fuel, producing a steel surface. This effort of Mr. Jessop led to the series of experiments on which is based the process described in this paper, the results of which in the production of pure blister steel have been mentioned; it has also in its progress suggested other results of some importance.

The conversion being progressive from all sides of a bar towards the centre, it could of course be arrested at any given point of its progress by withdrawing the bar from the furnace; the bar would then possess an outer coating of pure steel of any depth that may be required, and an internal core of tough unchanged wrought iron, offering a material that for many purposes would be far preferable to either of these materials in their single form, combining the hardness of the steel with the tensile strength of malleable iron; and, as but a comparatively short time is necessary for this partial conversion, the increased durability is further recommended by its cheapness. This process is applied to hardening the wearing surface alone of rails and tyres, by placing sand in contact with those parts of the bar which are not required to be hardened.

Taking as an example of the application of this process the important case of railway bars; if the surfaces were protected from the wear of the wheels rolling over them by a coat of hardened steel $\frac{1}{16}$ inch thick, there can be little doubt that a rail thus incased in steel would last three times as long as the ordinary rail, and it would still retain its tough core of wrought iron, and for all the purposes of a rail would be better than if formed of either material alone. Then to form an approximate estimate of the commercial result to the railways of this country: the extent of these railways may be taken at 8,000 miles, each yard of double way containing about $\frac{1}{8}$ ton of rails, a mile 220 tons, or 8,000 miles 1,760,000 tons; then the rails cost at 8*l.* per ton 14,080,000*l.*, and they want renewing (say) every 7 years. If the rails with steeled surfaces last three times as long, their life will

be 21 years, and there would result a saving of 110*l.* per mile per annum, a very important addition to the resources of any railway. In the case of foreign railways, where freight from England adds to the cost of the rails, there would be a further saving of two freights of the rails every 21 years.

In connection with railway bars the important and expensive item of points and crossings may be mentioned, which, if subjected to the above process, will show a very marked reduction in the expense of their maintenance. At some heavy goods stations they are at present a peculiarly costly item.

The idea naturally occurs that the same process may be applied to various articles, partially or otherwise, as their intended use may suggest.

The furnace used is shown at page 361; its principle of arrangement is to keep up the fire till the want of necessary repairs requires it to be burnt out, and it is divided into compartments, ovens, or retorts, in which the articles can be placed and withdrawn at pleasure.

Figs. 1 (a half section) and 2 (a longitudinal central section) show a single furnace with an oven or retort open at one end only; and figs. 3 and 4 show (in similar sections) a double furnace with two retorts, each open at both ends: the same letters refer to the corresponding parts in both furnaces. A is the firegrate below the retorts, BB, and communicating with a series of flues, CC, passing up both sides of the retorts into the Dome D, from which the openings, EE, lead into the chimneys, F, one chimney being placed in the centre of each side of the double furnace, giving a uniform distribution of the heat over the furnace. In all portions exposed to the heat the interior is constructed of firebrick or similar material.

In the furnaces in use for converting rails, a carrying apparatus with a balanced jib is employed to place the rails in a horizontal position on the top of the material for converting; a series of rails is so placed, and a flat shovel is carried into the furnace, holding the material for carbonisation, and in being withdrawn the material is sprinkled uniformly over the rails to the depth of about ½ inch; another layer of rails is then placed in the furnace and covered in the same way; and so on until the oven or retort is filled, when the door at the end is closed and clayed up, and the process of conversion at once commences, the heat of the furnace having been kept up nearly to the full temperature during the process of charging. In drawing the furnace, each layer of the carbonising material is raked into an iron box, and when full sprinkled slightly with water and the cover closed tight, so as to prevent waste from the action of the atmosphere; by this means the greater portion of the material is preserved for use in the next charge, and it is found that the same carbonising material serves for three successive charges with the addition of only about 10 per cent. of fresh material each time, thereby effecting a great saving in the cost of the process.

In some instances peculiar articles might require peculiar adaptations of the furnace. Besides the application to heavy articles, a large field is open of almost infinite variety. Some of the best cutting tools now used by the author are made from wrought iron converted by this process. Shovels and agricultural implements partake of the advantage, and, at a lower cost, will stand the work that a good tool would be expected to perform: made in wrought iron, converted, ground, and dressed, they take rank with the most expensive tools of the day, at a cost but little exceeding that of a very ordinary implement. Some specimens of files prepared by this process were shown; they were cut and completed in wrought iron, and then converted and hardened; for this manufacture the process is highly economical.

EXHIBITION OF INVENTIONS AT THE SOCIETY OF ARTS.

(*Continued from page* 345.)

We come next to a set of very useful machines by Mr. Herbert Mackworth, Government Inspector of Mines, for crushing and dressing metalliferous slags and stones, for crushing shale containing ironstone, and for purifying ores. A very good form of purifying machine, by Mr. Mackworth, was described at p. 169, No. 1776, Vol. 67, of the *Mechanics' Magazine*. The same gentleman also exhibits valuable specimens of shale, ironstone, and iron slags.

We observe next an improved Trap-door for mines and collieries; R. Rennie, Netherwood, Dumbartonshire.—This door is connected with a lever, which may be either vertical or horizontal, the connection being made by means of an endless wire-rope, or by tie-rods. This lever is acted upon by the wagon, and opens the door, allowing the wagon to pass through; a second lever on the other side of the door closes it in a similar manner.

Mr. W. Bridges Adams, Adam-street, Adelphi, exhibits several improved arrangements of Permanent Way, including his Suspended Double-headed Girder Rail, used on the London and North Western Railway; his Single-headed Girder Rail, used on the Bombay and Barroda Railway, and his Bracket Joint for ordinary double-headed rails—all of which have been described in this Magazine—together with his improved Fish Joint, which is formed by stamping the rail-ends into square channels, in which ribbed fishes of great lateral strength are recessed, the bolts and nuts being formed to key fast against the lower ribs of the fishes; his Mode of Securing ordinary Fish or Bracket Bolts, by drawing Plate-wedges between each pair; and his Railway Bridge of Small Span, in which he shows the double-headed girder rail, formed by two rails bolted together externally for railway bridges of 12 to 15 feet span. This completes the whole bridge structure, with rails included, and only requires to be laid upon the abutments of stone or timber on either side of the opening. Several other inventors exhibit specimens of improved constructions of permanent ways.

Switch Point and Signal Controller for Railway Junctions; John Harrisson, Homerton.—This invention consists in connecting the signals with the switch levers, so that the act of setting the switch throws the signals into such a position as to prevent any train advancing but that for which the switch is set.

Gibson's Patent Self-acting Railway Signal and Telegraph; Young and Pool, Hull.—In this system of signalling, the wheel of the engine, in passing over and depressing a gently-inclined lever fixed to the rail, causes the signal-post connected with it to turn to a position at right angles to the line, and thus to indicate "danger" to the driver of the following train. Several of such signals are connected.

Patent Railway Signals; W. Bond Paul, Langport, Somerset. These signals were described and illustrated at p. 291, No. 1807, Vol. 68, of the *Mechanics' Magazine.*

Mr. Myers, of the Whitechapel-road, exhibits an elaborate system of railway signals, the parts of which are of variable merit.

Patent Railway Brake; J. Sutherland, Pickerington-street, Paddington. — The object of the inventor is to lock all the wheels of the carriage or wagon simultaneously at pleasure. This is effected by placing drums on all the axle shafts of the carriage; round these drums are placed iron friction-bands coupled to a horizontal lever running along the frame of the carriage. This lever brings the bands into contact with the drums, thus acting as a brake.

Railway Brakes are exhibited by W. Paxon, Skinner-street, Snowhill, and E. Finch, Bridge Works, Chepstow.—The latter alters the position of the lever in respect to the axis by which the brakes are actuated, so as to compensate for the wear of the blocks.

Improved Railway Wheel, entitled a Horse Foot Wheel; W. Bridges Adams.—This improvement has for its object, 1st, by placing an elastic substance between the tyre and the wheel, to reduce the non-elastic load to the tyre itself, which may be made much lighter by reason of being saved from blows and by the absence of holes through it. 2d. By this arrangement a lighter wheel may be used, or one of cast iron, inasmuch as, the blow being prevented, there will be no tendency to break. 3d. The wheel may be put together with the tyre cold by simple screw pressure, without needing skilled mechanics. 4th. The tyres and wheels being all formed to exact gauges, a worn tyre can be taken off and replaced in any locality, without needing workshops or machinery.

Mr. Adams also exhibits a Railway Wheel in which wood is applied in a continuous hoop between the wheel and tyre.

Locomotive Engine; G. Inman, Susannah-street, Poplar.—This is a curious locomotive, in which it is proposed to cause high-pressure steam to expand a series of hollow discs or steam chambers arranged round the axle, and carried by each of the wheels of the locomotive. These discs are connected by radial pipes to the bosses of their respective wheels, and have attached to their outer ends radial rods, which pass through slots in the wheels, and carry feet, which bear upon the ground in succession, for driving the engine forward.

Apparatus for expediting Town Postal Communication; O. H. Hodges, Crown-street, Finsbury-square.—This apparatus consists of a subterraneous tube, with small boxes or carriages travelling within it, for receiving letters dropped into pillar letter-boxes. The letters are thus to be constantly transmitted to the central stations for delivery.

Omnibus and Carriage Brake; R. K. Aitchison, New North-street.—This brake is self-acting. When the horses stop the backward thrust of the pole acts upon two levers which apply the brakes. The same effect is produced by the carriage over-running the horses in descending a hill. When the horses begin to draw, a spring releases the brakes.

Indicator for Omnibuses, &c.; Francis Parker, Elm-house, Homerton.—This apparatus consists of a tube with a box at the top filled with balls. There is an arrangement by which one ball at a time is allowed to fall into a lower compartment and strike a bell, thus indicating the number of passengers.

Carriage-door Shields; C. Norton, Hawley-road, Camden-town.—These are to prevent accidents from the shutting of railway or other carriage doors. They consist of metal plates, folding over each other, on the hinge side, so as to prevent the fingers being crushed.

Tubular Carriage Shafts; J. Clarke, High-street, Shiffnal.—These shafts are made of a taper tube of malleable iron, and are said to be stronger, cheaper, and more durable than ordinary wooden shafts.

Horizontal Fin-expanding Canopy, for Carriages, Boats, &c.; T. L. Scowen, Allen-road, Stoke Newington. This canopy is constructed on the principle of the fin of a fish, with a horizontal action, which enables it to be made to any shape or size, and to fold up in an instant.

A National Coal Gas Apparatus is exhibited by J. T. B. Porter, Lincoln, and is suitable for the manufacture of gas either on a large or small scale; but it is peculiarly adapted for supplying private houses, workshops, railway stations, lighthouses, and ships. A Patent Gas Apparatus is also shown by Sharman and Smith, Wellingborough, Northamptonshire. The model shows a complete apparatus for making gas to supply three or four lights, with the exception of the tank and holder.

Patent Dry Gas Meters; J. Meacock, Snow-hill and Giltspur-street. In this meter the leather diaphragm is held between two flat metal rings and screwed up to a frame, instead of being fastened with the soldering iron, which is apt to injure the leather. The valve adopted does not rise from its facing.

A Patent Gas and Air Test Gauge is exhibited by W. Reichenbach, Borough-road, Southwark. It is used for detecting any impurity that may arise in the manufacture of gas; also for testing the quality of deleterious air in mines or confined spaces.

An Annular Recoil Engine, by T. Ivory, Ainslie-place, Edinburgh, resembles Barker's Mill in its chief feature.

Double Acting Horse Wheel; T. Mann, Boro'bridge. This wheel is so arranged that, as the horses attempt to walk, the motion of their feet causes the platform to rotate in one direction, whilst their shoulders push the bar or power lever round in a contrary direction, and the two motions are combined by gearing.

An Eighteen-inch Planing Machine is exhibited by Batho and Bauer, Salford, Manchester; a Double-Action Traversing Drilling Machine by A. Shanks, John-street, Adelphi, London; a Horse-shoe Machine by Henry Burden, Troy, New York; a Double Platform Weighing Machine by Julius Schonemann; and a Grinding and Levigating Apparatus by H. Goodall, Derby. This invention consists in an arrangement whereby the operations of grinding or levigating various substances may be performed by the aid of a pestle instead of rollers or flat grinding surfaces, and was described in a back volume of the *Mechanics' Magazine.*

(To be continued.)

LORD CLARENCE PAGET ON THE ROYAL NAVY.

If men would say only what they know to be true, or if they would leave unsaid what they know to be untrue, it would be a glorious thing for the world. But shortsighted men fancy they can promote their own interests, perhaps even the interests of society, by the confident assertion of that which they know to be untrue, or by the romance and exaggeration which they associate with the truth. We are led to make these remarks by the report of Lord Clarence Paget's speech on the Navy Estimates. Any man who knows, as we do, how difficult it is to get the Government authorities, and, indeed, any other authorities comfortably situated, to undertake the responsibility and anxiety of making experiments and innovations, cannot but feel vexed when excuses are given them for refusing to listen to expostulation and receive advice. And such excuses are given them when the men who stand forward to represent the popular feeling misrepresent facts and propose ridiculous schemes.

Objections have very properly been made for years past to the construction of the huge three and four-storied floating towers, which, compared with long, low batteries, can neither fight nor run; for their guns are so high that they must be of small calibre, or the ship could not bear them; and she herself is so short, that she has but little room for guns and fuel, while the resistance to motion is at least as great as in a ship of twice the length. But Lord Clarence Paget, in endeavouring to enforce this principle, is reported to have made the

following grave misstatements with reference to the ships composing the English Navy, viz., that "not a man-of-war steamer could carry 4 months' provisions; not one could carry 4 days' coal."

Now, what are the facts? The *Royal Albert*, a first-rate, carries coal for 8 days' full steaming, or for 16 days' ordinary steaming. The 90-gun ships, *Agamemnon*, &c., also carry 8 days' coal. One, at least, of the 21-gun corvettes carries coal for more than 13 days, and some of the sloops for more than 16 days. The very smallest gunboats have fuel for 10 days, and his own ship, the *Princess Royal*, carries fuel for more than 7 days' full steaming, or for about 15 days' ordinary steaming. Then, with regard to provisions, one example occurs to us immediately, in the *Agamemnon*, of a ship which carries *five months*' provisions for her 860 men.

How can Lord Paget expect that any proposals of his will be treated with respect by the authorities whom he so unscrupulously traduces?

Let us look now at what he proposes. He told the House that he had had drawings and models made by an eminent shipbuilder, in conjunction with a first-rate engine-builder, of a man-of-war "carrying 12 pivot guns, of 95 cwt. each, under a covered deck, the tonnage not more than 2,600 tons, carrying 16 days' coal under full steam, with a speed of 13 knots, to carry six months' provisions for 500 men, with a draught of water not more than 21 feet."

The *Shannon*, 50-gun frigate, happens to be about the size proposed; her burthen is rather more than 2,600 tons. Let us examine the proposition by the aid of what is publicly known about her. She has 6 inches more draught of water than Lord Paget's design, yet, with engines of 600 horse power, she can only realise between 11 and 12 knots, and carry coals for $5\frac{1}{4}$ days, that is about 350 tons, with 4 months' provisions for 500 men. How he would get $1\frac{1}{2}$ knots more speed out of her without increasing her engine power we know not; but, supposing no increase, he would yet have to find room for two months' more provisions, and for three times the quantity of coals, *i.e.*, for 600 or 700 tons more than she carries. The scheme is plainly impracticable. Nothing less than a vessel of 4,000 tons' measurement could do what is here proposed. In other words, it would require a ship as large and costly as the *Marlborough*, which carries 131 guns, to take Lord Clarence Paget's 12 guns! Yet this gentleman coolly tells the House that until a Committee of naval officers is called together, and asked for their opinions on the subject of shipbuilding, we shall never get any thoroughly efficient ships built.

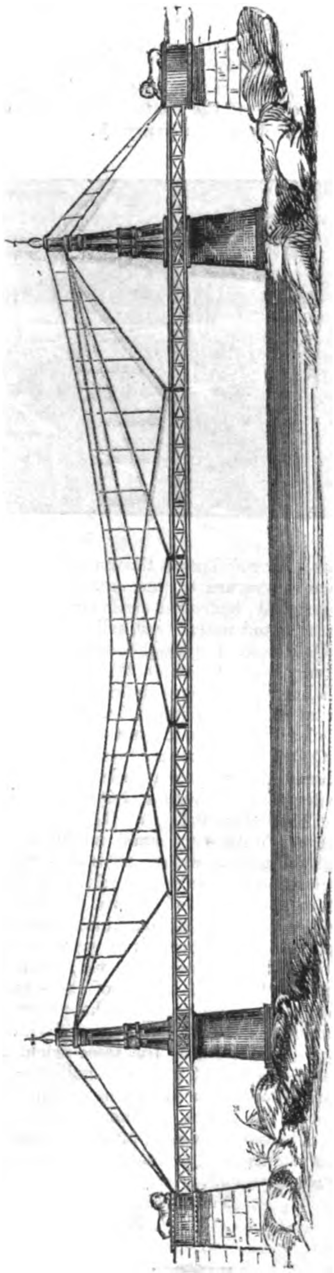
We hope the Government will never be induced to do such a very stupid thing. The architectural notions of Lord Paget are probably quite as good as those of naval officers generally, for there are more things in shipbuilding than are dreamt of in their philosophy.

ORDISH'S RAILWAY SUSPENSION BRIDGE.

An improved suspension bridge, suitable for railway as well as ordinary traffic, has recently been patented by Mr. R. M. Ordish, C.E., of Great George-street, Westminster. The roadway of this bridge is supported by two longitudinal girders suspended at points about sixty feet apart by straight chains, which run from each point to opposite piers, and are anchored to abutments in the usual manner. The straight chains are suspended from a light curved chain, which carries their weight, and serves to retain them in straight lines, as shown in the annexed engraving, which represents the cheapest form of bridge, in which the supported points in the platform are each suspended by two separate chains. In bridges of several spans, straight chains cross each other in the middle of each span, and are continued to the foot of the opposite pier: thus providing against the contingency of one span being loaded and the others at the same time unloaded.

In the ordinary suspension bridge it is found that the weight of the train depresses that part of the platform in its immediate neighbourhood, and elevates every other part; and thus, as Mr. R. Stephenson has expressed it, drives the platform in a wave before it. The principle of construction now proposed is to obviate this by forming an inflexible system for supporting the platform and moving loads. The inclined straight chains are applied to support the permanent load of the platform and moving loads only, and are so disposed that no extra material is required as bracing, to prevent distortion when the structure is unequally loaded. These straight chains are supported and retained in straight lines by being suspended from the curved chain by vertical rods. The following is a statement of Mr. Ordish's views upon the subject:—The load on the curved chain being constant under all circumstances, the curve

of equilibrium is (he says) maintained



in all cases of equal and unequal loads on the platform. From the weights of the platform and any equally or unequally distributed or moving loads, direct tensile strains only are induced and taken by the straight chains, and conveyed to the abutments—the stable equilibrium of the structure not being disturbed. The effects of expansion and contraction from variations of temperature have no tendency to alter the relative position of the parts of the structure; therefore the conditions of stability remain unaltered, and the roadway is theoretically and practically rigid and immoveable under all circumstances and descriptions of traffic, excepting, of course, the deflection due to the elasticity of the metal used in the construction. This is proposed to be reduced by subjecting the links to a proof-load approaching the limits of elasticity—the amount of extension and consequent deflection from any load on the completed structure being reduced to the difference between the extension of an unproved bar due to such load, and the permanent set induced in a bar by the extreme proof-load.

The cheapness of bridges on this principle is remarkable. The cost of their superstructure for single spans is stated to be about 18 per cent. less than that of ordinary suspension bridges, and only about one-fourth that of girder or iron-arched bridges; and when it is considered that these bridges are to be equal in rigidity, and superior in strength, durability, and appearance to the best girder bridges, the importance of the improvement will be manifest.

PARKER'S PATENT VENETIAN BLINDS.

In the article upon the *Northam*, in our last Number, mention was made of a novel description of Venetian blinds fitted to that vessel. We now give the following description of these blinds, which are the invention of a Mr. Joseph Parker, joiner, of Southampton, and which have been brought into use under the auspices of Captain Engledue, as before mentioned. In the accompanying engravings, Fig. 1 is a front view of the improved blind, showing the plates or louvres closed; and Fig. 2 is a horizontal section of the same taken through the middle. Fig. 3 is a horizontal section through the line, *x*, *x*, of Fig. 1, showing the parts by which the blind is opened and closed. The plates or louvres, A, A, are respectively connected by spindles, *a*, *a*, with the levers, B, B, which again are con-

nected by pins to side levers, C, C. These levers, C, C, are jointed to rods, D, D, to which motion may be given by the sliding stud, E. By moving this stud to the right,

Fig. 1.

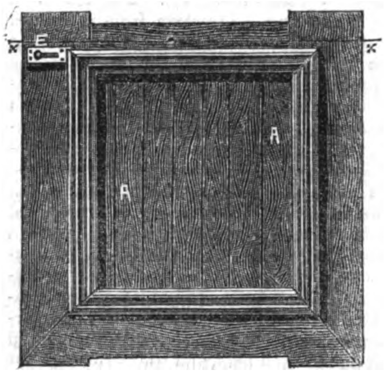


Fig. 2.

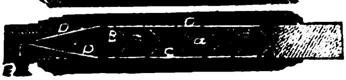


Fig. 3.

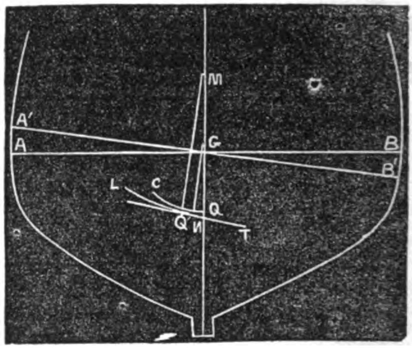
the whole of the louvres may be opened either to a small extent to admit air freely, but prevent persons looking through them; or to a larger extent, to permit them to do so.

STABILITY OF FLOATING BODIES.

To the Editors of the Mechanics' Magazine.

Gentlemen,—I think the following a very satisfactory proof of the principle which I enunciated in my letter of last week, viz., that when a body floats in a position of stable equilibrium the height of the centre of gravity above the centre of buoyancy is a minimum.

Let the figure represent a transverse section of a floating body through its centres of gravity and buoyancy. A B is the water line in the position of equilibrium, which is supposed stable. G is the centre of gravity, Q the centre of buoyancy, M the metacentre, above the centre of gravity. When the body is deflected through a small angle, A′ B′ is the water line, Q′ is the centre of buoyancy. Suppose the curve Q Q′ L to be the locus of the centre of buoyancy, and Q′ T the tangent to this curve at the point Q′, which by a well-known theorem is parallel to the water line A′ B′, and therefore the line G N, perpendicular to Q′ T, meeting Q′ T in N, is the vertical height of the centre of gravity, G, above the centre of buoyancy Q′.



By another well-known theorem, M is the centre of curvature of the curve Q Q′ L, at the point Q; hence the circle Q C, whose centre is G, and radius G Q, falls above the curve Q Q′ L, in the neighbourhood of Q. It is very easy to show that the curve Q Q′ L lies wholly above the tangent Q′ T, except at the single point Q′. Hence it seems clear that the tangent Q′ T to the curve Q Q′ L does not meet the circle Q C, and therefore the perpendicular G N must be greater than the radius G Q of the said circle. From this it follows that G Q is a minimum. With very small modification this method may be employed to show that for a position of *unstable* equilibrium the height of the centre of gravity above the centre of buoyancy is a maximum. It may be applied, too, to prove the converse of each of these propositions, viz., that a position in which the height of the centre of gravity above the centre of buoyancy is a minimum is one of stable equilibrium, and a position in which the same height is a maximum is one of unstable equilibrium. The same theorems may, I am convinced, be proved by means of the doctrine of work. I cannot, however, make this mode of proof sufficiently presentable to submit it to you at present.

Yours, &c.,

A Mechanic.

PAYING-OUT OF THE ATLANTIC TELEGRAPH CABLE.

BY COMMANDER MOLYNEUX SHULDHAM, R.N.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I have read in the *Times* of the 3d inst., that it is the intention of the Directors of the Atlantic Telegraphic Cable Company to invite engineers and mechanics to inspect the paying-out machinery when it is completed, and to solicit as a favour their critical observations and suggestions upon its form and construction.

I am unfortunately so great an invalid, that I fear I shall never be able to inspect the machine in question; therefore it would seem that any suggestions of mine would be valueless, and so they would, had I not in last August invented a similar apparatus long before the Company's Engineer, Mr. Bright, took out a patent for the machine in question: my invention, however, did not include that portion of his regarding brakes. In strict justice to the patentee I declare that he could not have known what had passed in my mind about it, for all I did was to write on the 6th September a letter to the Secretary of the Atlantic Telegraphic Company, in which I mentioned that I had thought of an important invention for laying down the cable; and I also, in a subsequent communication to Mr. Field, mentioned that I had invented an apparatus for that purpose, without explaining it, so all it could do would be to direct engineers' or inventors' attention to the subject.

As an old inventor I know it is no uncommon event for two or more persons to hit upon similar inventions, even at nearly the same time, and it is only that mine may possibly differ from Mr. Bright's in its *details*, which may be useful as mites to the great national undertaking, that I venture thus publicly to endeavour to explain them.

My original idea was to invent a self-acting paying-out apparatus that would require no attendance whatever (except that of watching), and that consequently its success should not be at the mercy of the skill and judgment of any person, the cable simply paying itself out by the reaction of the water upon it. There should be no sinking power in combination with it, excepting when a cable of light specific gravity was used, when the sinking force would be inconsiderable; and if I made use of a brake it would only be with the view of bringing a more equable strain upon the cable, under all rates of sailing: for, supposing the ship to be sailing at the rate of 12 knots an hour, and then from some cause to be suddenly reduced to 4 or 5 knots, might not the tangential or fly power accumulated in the pulley-wheels, from their size (5 ft. in diam.) and rapid motion, give out more cable than the vessel's rate of sailing? If that power so acted it would be beneficial, by preventing the snapping of the cable, in giving out a length of slack cable on the supposition that she was arrested for some time. But knowledge on this head can only be acquired by experience.

A brake or stopper would, however, be required to arrest the cable should any mishap, regarding its buoyancy, bring an inconvenient strain on it and the apparatus. And I may here remark that I should have no hope of success in the use of a cable whose specific gravity is so great as that of the Company's, unless it were in any way buoyed up so as nearly to float on its being payed out, and to sink in half-an-hour or an hour afterwards, when at the distance of some miles from the vessel. I am not singular in advocating the principle of a *floating-sinking* cable, for Mr. De la Haye, of Manchester, has taken out a patent for one. The floating of it in combination with its rapid sinking would answer well for the safe acting of the apparatus, or with a cable of light specific gravity, such as Mr. Bodie (the Master of the Agamemnon) has recommended in the *Mechanics' Magazine*.

The first intimation I had of Mr. Bright's invention being similar to mine was contained in the 1790th number of the *Mechanics' Magazine*, dated 28th November; and I cannot do better than copy his short description of it as follows:—"The second part of this invention consists in machinery for effecting the regular unwinding of large coils of telegraphic cable, by placing in the centre eye of the coil an upright shaft, carrying one or more sheaves or guides, by which the cable is taken hold of, and guided from the coil to the inner edge of one of the sheaves, which is in a line with the centre of the coil. This part of my invention does not require engravings to illustrate it."

Now, the above description is so easy of comprehension that all I have to do is to endeavour to describe the machine more in detail, as I had imagined it, and made a drawing of it at the time it occurred to me.

From my earnest desire to make the machine as simple as possible I had thought of only using four pulley-wheels. The pulley at the extremity of the arm, which lays hold of the cable from the coil, I call No. 1: the cable would pass over it in a deep groove in the sheave, and would then pass under pulley No. 2, and be led upwards through the ship's decks; the said pulley

being so fixed on the arm that the now perpendicular cable would be in the centre of the coil, or, as I will show hereafter, only slightly removed from it. The pulley No. 3 would be placed about 7 feet above the upper deck, the cable led over it, and carried over pulley No. 4, placed at the stern of the ship, from whence it would pay itself out into the sea. This arrangement could not be effected unless the upright shaft were a little removed from the centre of the coil, say a trifle more than the semi-diameter of the funnel, to allow the cable to pass clear of it, as well as the masts. By this mode the cable would meet with no obstruction, and, being 7 feet above the deck, would be in nobody's way. It should, however, be protected by a strong wooden case, with a few rollers on the under side of it to prevent it from swagging, owing to the distance from pulley No. 3 to pulley No. 4. The case might be supported by sheers or posts secured to the deck. The greatest care should be taken to box up the cable from the deck upwards to the third pulley, and from it to the fourth pulley, in order to prevent the possibility of ropes, or, indeed, any substance whatever from damaging it, and the case in question would also exclude it from the effects of wind. I should also think it needful, for the sake of lessening the chances of accidents, to have the booms and the sails placed above the case; and I have thought it would be a still greater security to have a splinter netting, by which method the sheers or posts might be dispensed with altogether, as the case with proper appliances could be secured under the splinter netting. Any other contrivance would require additional pulley-wheels and add to the complication of the machine; notwithstanding, I thought at one time of leading the cable, with its case, over one of the bulwarks, and also of placing it just sufficiently high from the deck to be clear of all obstruction, but requiring the officer and crew to climb over it, or stoop under it, which they would rather avoid, I think.

I may mention that pulley No. 1, at the extremity of the arm, which first lays hold of the cable, is imperfect in its action, inasmuch as the cable presses more on one side of the sheave's groove than on the other, instead of the strain acting, as it ought, at a right angle to the axis of the sheave; but by reason that such imperfection could not be remedied without great complication, and that the time of its workings would be short, perhaps a practical engineer would pass over it, which, if the machine were intended to be in constant work for years, he would otherwise not do.

On the supposition that the strain on the pulley-wheels when in work would not exceed from 3 to 5 hundred weight I should construct the pulley-wheels as light as possible—wooden ones with spokes would do—but as a wire rope is used the grooves should be segments of cast-iron securely rivetted to the woodwork. Light iron wheels might answer as well, according to the opinion of practical engineers, who, witnessing the amount of the pliability of the wire-rope, could best judge of what diameter the pulley-wheels should be, and their requisite strength. The arm which carries the pulleys would be extended to the opposite side of the shaft for the purpose of affixing a weight to it, to balance the other arm with its two pulleys and cables, and thus causing the better working of the machine.

With regard to that portion of the patentee's invention relating to the winding and unwinding of the cable, I frankly state that I do not comprehend why it should be necessary at all. I have no doubt it is intended for some useful purpose which the great practical experience of the Company's Engineer has suggested to him, whereas I have not had the advantage of even having seen the cable (excepting six inches of it), or any of its appliances; therefore my humble suggestions may be faulty and my ignorance excusable. But as my original idea was to invent a self-acting machine of a simple nature, and to avoid complication, I naturally feel adverse to any appearance of the latter, which, however, may be very necessary. I even carried the self-acting principle so far that there should be a contrivance to turn off the steam whenever, through the fouling of the cable, its strain should be greater than the one designated; thus the vessel's way would be diminished instanter, without interfering with the engineer's power to stop her or back her. The snapping of a cable, and its consequent loss, is really such a serious matter that no precaution, in my humble opinion, should be neglected for the prevention of so great a calamity.

I shall rejoice should any of the details which I have pointed out be found of the smallest use in this our great national undertaking.

Before concluding I may remark that it is foolish for any person to inform the public that he had thought of the same idea which had induced an inventor to patent; but in this case it is an exception, because the patentee very properly has invited engineers and mechanics to make critical remarks or suggestions on his patent machine. Besides, I cannot criticise what I

do not understand, and otherwise should be loath to do so. I wish Mr. Bright every success in his very arduous forthcoming work.

I am, Gentlemen, yours sincerely,
MOLYNEUX SHULDHAM,
Commander Royal Navy.

The Manor House, Dursley, Gloucestershire, April 9th.

PHOTOGRAPHIC ILLUSTRATIONS FOR BOOKS.

AT a recent Meeting of the Royal Scottish Society of Arts, Professor C. Piazzi Smyth addressed the Society upon the above subject. After alluding to various past attempts, attended with more or less success, to produce either direct or indirect copies of photographs for publication, the author referred to the illustration of his recent work on "Teneriffe," published by Mr. Lovell Reeve, of London, as an example of a large impression of a book illustrated with pure photographs. The requisite number of copies had been procured in this case by adopting the principle of printing from *secondary* negatives, so that several printers could be employed at once on the same plate. Further advantages had followed from this method, for the second negatives could be made to give much more intense pictures than the first; and in one instance the original picture had been an opaque positive, backed up with black varnish, and as such generally supposed incapable of being multiplied. Its repetitions, however, produced by a process which the author described at length, form plate 18 of the book in question. If there existed still any difficulty in supplying the public with copies of the work as fast as they were ordered, Mr. Lovell Reeve had reported that the difficulty was chiefly in getting experienced mounters — each photograph having to be pasted on a plate card, and each book having forty such mountings. This is, however, a trouble which must yield in time, if the public only approve of photographic illustrations; and in such case a new and suitable branch of industry will be opened up to the ill-paid class of seamstresses in large towns.

PATENT MUSEUM, SOUTH KENSINGTON.—The Commissioners of Patents having made arrangements for the daily gratuitous exhibition of their collection of models, portraits, &c., in the Museum Buildings at South Kensington, the removal of such collection to the Commissioners' Office is for the present postponed.

THE INDIA PATENT ACT.

IN the Legislative Council of Calcutta, on the 27th Feb. last, the Clerk reported that he had received, from the Secretary to the Government of India in the Home Department, copy of a despatch from the Hon. the Court of Directors with respect to the Patents for Inventions Act, in which the Court desire that no time be lost in laying before the Council the draft of an Act for the protection of inventions, and that, when the same is approved of by the Council, it be forwarded to the Court, in order that the necessary steps may be taken for obtaining the sanction of the Crown thereto.

AN IMPROVED SELF-TUNING PIANOFORTE.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I have invented an arrangement, by the use of which I think that pianofortes would very seldom or never require to be tuned, and so confident am I of its success, that, if original, I should not hesitate to protect it immediately, as far as its efficacy is concerned, did I not wish the public to have the benefit of the invention. I will endeavour to describe it with sufficient clearness without the aid of a diagram, for I think the mental faculties should be trained so as to fully appreciate a clear description without the assistance of ocular demonstration.

Let every cord communicate with a spring, which should be of sufficient strength to give the necessary note. Each spring should be coiled and act as that of a clock or letter-balance does (the method of transmitting force is different), so that any contraction of the cord is met by the giving of the spring. Now, it is evident that as the power of a spring augments with the proximity of its coils, the tension of the cord must increase with its contraction. Hence some expedient is necessary for the purpose of regulating the power of the spring. The common fusee is what is wanted. Let each cord pass over a fusee after connexion with the spring, taking care that the largest part of the fusee be first in connexion with it, because, as the strength of the spring increases, it is requisite that the leverage should also be augmented, in order that its power with respect to the cord should remain the same, whatever be the contraction of the latter. It is evident that, as the largest part of the fusee is first in connexion with the cord, it will leave it at the smallest part, and that as the cord contracts it will wind off, and hence have an increased

leverage or circumference of power to act upon. The fusees might be simply hung upon pivots, and would not require catches of any kind.

The same applies to wires, whether plain or hollow; and I may add, that simple springs, as those of a gun lock or window fastening, might be found to answer the purpose—especially when we consider how small the expansion and contraction of these wires are. Still we should want the fusee. It would certainly be possible to effect all this merely with weights, when no fusees would be required. Nevertheless, I think that for compactness and elegance this method is decidedly inferior.

This is the general outline of my plan, to which I can see no objection. If really as useful as I am led to believe that it would be, I do not fear for its adoption; but there may be objections of which I am unaware.

I am, Gentlemen, yours, &c.,

J. A. D.

April 6, 1858.

THE JOINING OF THE ATLANTIC TELEGRAPH CABLE.

To the Editors of the Mechanics' Magazine.

Gentlemen,—As it seems to be the intention to join the cable in the middle of the Atlantic, and as some difficulty may be experienced in consequence of the cable being twisted in different directions, might not the following method be useful, as it would effectually prevent it unwinding, and the expense of it would be trifling:—

On arrival at the spot where it is intended to join the cable, the ends should be brought from the vessels containing them to a ship stationed between, where they should be joined and secured to the top of a strong iron rod, heavily weighted at the lower end. Both vessels containing the wire should then slowly proceed in opposite directions till a sufficient quantity was deposited, when by means of a winch (furnished with a powerful brake to regulate the descent of the cable and rod) it might be safely lowered; then, unless the rod and weight turned completely over, the cable must necessarily go to, and remain at, the bottom without untwisting.

I am, Gentlemen, yours, &c.,

Tyro.

London, March 22, 1858.

NATURAL METHODS OF PROPULSION.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Your correspondent, General Thompson, is, no doubt, correct in stating that fish attain their greatest velocity by the action of their tail, but there is a peculiarity in it sometimes which I have never seen noticed. They have a way of curving both extremities by which they are enabled to raise, and perhaps in some measure to lower, themselves in and propel themselves through the water, and I have no doubt that the tail is smallest in breadth in the middle to allow this. Here is an example of adaptation. What I say is no fancy, as any one may convince himself by noticing the action of the tails of fish.

I would inform your correspondent that he may see an example of jumping by means of making the head and tail meet and then returning to a straight line in large cheese maggots. I have been much struck at seeing what power they possess, and the distance to which they can, as it were, jerk themselves.

The motion of fish alluded to is somewhat similar to that of eels. I have noticed it in minnows and gold fish, the former especially, while ascending in the water.

It is well worthy of remark with what ease and dexterity fish can move their fins at any angle, and turn that part of each which corresponds to the blade of an oar in any direction.

It appears to me that a propeller constructed on the principle of motion made use of by the eel would be to some extent effectual; and better still, one on the principle of the swinging motion of the tails of fish.

I think that the backward propellers of the sea-lion and of many water fowl show us that propelling machinery should be placed at the stern of vessels, and I would suggest whether this is not one reason why the screw is superior to the paddle-wheel.

Human science is at the best very imperfect, and I doubt not that this is in some measure occasioned by our neglecting to pay proper attention to the corresponding examples of nature; they are surely worth consulting, and should always incite our regard and admiration, inasmuch as we see perfection of motion embodied in the least possible bulk and weight on the one hand, and the most palpable deficiency in all these respects on the other.

I am, Gentlemen, yours, &c.,

J. A. D.

April 6, 1858.

HERBERT'S FLOATING LIGHT-HOUSES.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I have been much interested by your account of the floating beacons that always maintain their vertical position, and the proposed floating lighthouses on the same principle. The principle you point out is quite satisfactory—that a buoy moored by the point where the line of resultant force from the pressure of the water intersects the vertical axis will retain its vertical position in any *current*. Of course it is understood that the buoy must be cylindrical or conical, with the axis vertical. But will this principle avail to keep it vertical when floating on *waves?* Part of the oscillation of a buoy is, no doubt, due to the force of the waves as they strike it; and the pressure of waves is ascertained to be very great in the horizontal direction. The principle you point out will remove the cause of oscillation, but I do not think it can prevent the vertical axis of the buoy from deviating from the vertical exactly as much as the surface of the wave deviates from the horizontal.* You say that a buoy of the new construction has been observed to oscillate through an arc of ten degrees, when one of the old sort oscillates through twenty-five. The ten degrees may probably be reduced by more accurate construction and larger size of the floating structure, but I fear it will always be too great to admit of a floating lighthouse tower. No doubt such a floating light as that proposed would be a vast improvement on the present light-ships.

I am not conversant with nautical affairs, but this is to me an interesting question of theoretical mechanics. J. J. M.

Belfast, April 8, 1858.

CONCUSSION-FUZE.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—In placing the rivets in the twelve fuzes that were successfully tested in the Woolwich marshes, and to which the late talented Sir George Murray, when Master-General of the Ordnance, alluded in his letter, 19th August, 1845, I poured the molten lead into the socket holes over the pin-heads; this caused the wood of the beechen fuze-case to be slightly *charred:* but I now prevent any charring by placing a thin metal cup with a small hole in its centre for the pin-head in the socket to enter, and then pour the molten lead into the cup by means of a collar with a small brass funnel in it, which fits on the fuze-case, the funnel pointing immediately over the metal cup. The three shells which struck the *soft* clay mound, and did not explode for want of a *sudden* shock, gave a favourable indication, because they prove that the connecting pin may be so "modulated" in its centre as not to give way when the shell strikes water, but will afterwards give way on striking a ship's side.

The best *time*-fuze, Captain Boxer's, R.A., allows a wide margin for long and short comings, the perforations in it allowing a second of time between each. The shell flies *four* hundred yards in a second. Thus when fired against a *moving* column the shell may burst *beyond* the column, thus going for nothing, as I observed during the battle of Albuera; when our shrapnels were directed at a moving column of the French, the shells bursting *beyond* the column. My concussion-fuze is represented by Fig. 7, page 2, in my pamphlet on projectiles—Hebert, 88, Cheapside. J. NORTON.

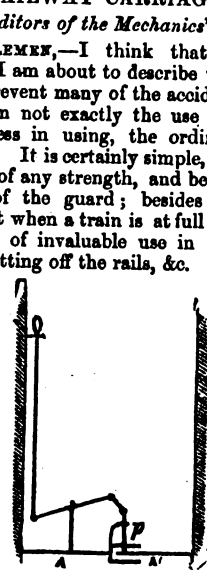
N.B. About 1844 I described my fuze to the Earl of Rosse, whose knowledge of Mechanics is of world-wide celebrity.

* We have hitherto expressed no opinion upon this point, but we do not hesitate to say that we share the doubts of our correspondent.—EDS. M.M.

COUPLING APPARATUS FOR RAILWAY CARRIAGES.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I think that the contrivance I am about to describe would altogether prevent many of the accidents which arise from not exactly the use of, but the carelessness in using, the ordinary screw coupling. It is certainly simple, and might be made of any strength, and be under the control of the guard; besides which, it would act when a train is at full speed, and hence be of invaluable use in case of an engine getting off the rails, &c. A bar, A,



should be fixed into one of the ends of every carriage, into the end of which

another bar, A′, attached to the next carriage, should be made to fit. These should be united by the vertical pin, *p*, which should be worked by means of the levers, *x*, *x*, and the handle. The lever, *x′*, is necessary in order to give the pin a strictly vertical motion, which, I think, would be requisite, and could be accomplished by causing it to slide in the guide which is shown over the bar, A. The buffers might meet midway between the carriages, as usual, and I think that it would not be necessary that the bars, A, A′, should be of equal length—why not make A′ the shorter?

I am, Gentlemen, yours, &c.,
J. A. D.

April 6, 1858.

IMPROVED BARKER'S MILL.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Upon the principle of the hydrostatic paradox I think that this machine might receive an additional improvement. For this purpose let there be a globe where the horizontal arms meet the vertical, the size of which should depend upon that of the machine. It should not, of course, be so large as, when full of water, to be of sufficient height to counteract the increased reactive force produced by the increased velocity with which the water would make its exit from the horizontal arms. I think that this might be applied to all hydraulic machines upon the reactive principle.

I am, Gentlemen, yours, &c.,
J. A. D.

April 6, 1858.

APPARENT VIBRATION OF STARS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—As no one has yet demurred to or offered any rationale in explanation of my theory as to the cause of the above, I am induced to believe that there is something in it, and think that the phenomena can be further explained by the following considerations:—

We know that the light which we receive from distant bodies is less than that which comes from those which are nearer. Consequently, the light of objects close at hand eclipses that of distant objects; and considering also the light which is necessarily lost in its passage from dispersion, we can explain their very faint appearance. Now, the ocular axes are never perfectly at rest, more particularly when we look at bodies at a distance; hence the impression produced upon the retinas is retained after the eyes have been removed from the object; so that according to the vibratory motion of the axes will the apparent position of the object appear.

If the object moves, our eyes are enabled to follow its motion, and the vibratory motion of the axes will then be prevented.

Apply this to the planets. They move; and as our eyes follow them, they appear to us steady; while those bodies which are, with respect to us, motionless, appear to be in constant vibration. The delusion, then, rests entirely with ourselves.

I am, Gentlemen, yours, &c.,
J. A. D.

April 6, 1858.

THE NEW "BIG BEN."

To the Editors of the Mechanics' Magazine.

Gentlemen,—How is it that Mr. Denison, who is the manufacturer of the new "Big Ben," is also, as referee, to be the *judge of his own work?* We may guess the verdict. Should not that be left to Sir Charles Barry, or some other competent disinterested (?) person?

Perhaps you, or some of your numerous readers, who will have to pay their share of the cost, will ascertain whether or not there is any *jobbing* in the affair.

Yours, &c., Q. C.

Temple.

THE MOON'S ATMOSPHERE.

To the Editors of the Mechanics' Magazine.

Gentlemen,—I think quite enough of your valuable space has been occupied with the discussion of General Thompson's letter on the *necessity* of the moon's atmosphere, and I shall not therefore trouble you further on the subject.

It appears to me, however, that your correspondent should write anew the elements of natural philosophy, with a glossary of terms, in order that one might understand, in any future discussion or in perusing his epistles, the meaning and value he attaches to the terms he employs.

Your obedient servant, J. T.

The Siamese Presents.—The Queen has been pleased to send the presents of the King of Siam for public exhibition at the South Kensington Museum, and Lord Palmerston has added to them the Siamese sword of State presented to him.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

STEWART, C. P., and D. G. HOPE. *Improvements in the valve gear of locomotive and other engines.* Dated July 9, 1857. (No. 1905.)

This may be described generally to consist in a lever having two or three arms combined with a crank or radius pin or an eccentric, one arm of the lever being connected with the crank radius pin or eccentric, the fulcrum of the lever being so arranged that it can give way with the rectilinear motion imparted to it, the eccentric crank or radius pin being also arranged in a certain position relative to the crank or piston of the engine. The mechanism above referred to will produce a motion to work the valve of a steam-engine so as to rotate its crank in either direction, and will also give motion to a valve having lap—that is, one which extends over the steam ports when in the central position, so as to work the steam at various grades of expansion.

SWAN, J. H. *Improved machinery and steam-engine for crushing quartz and other hard substances, and for amalgamating.* Dated July 9, 1857. (No. 1906.)

This invention cannot be described without engravings.

CLERVILLE, J. J. C. DE. *Improvements in the manufacture of oil-cloth and imitation leather,* (A communication.) Dated July 9, 1857. (No. 1908.)

Instead of painting and printing with oil colours upon a ground made on a white fabric, the patentee employs a fabric of any design and material, previously dyed or printed by any of the processes used in dyeing and printing woven stuffs. On this he makes a transparent ground by applying coatings of clarified linseed oil, previously made, drying in the usual way. He then makes the surface smooth with pumice-stone, and, lastly, he applies upon it a hard varnish, such as asphalte varnish, to which he sometimes adds Prussian blue for black articles, and copal varnish for all coloured articles. There are various modifications of the process of manufacture included in the specification of this invention.

RUSSELL, J. S. *Improvements in apparatus and slips for moving ships and vessels out of and into the water.* Dated July 9, 1857. (No. 1909.)

These consist in constructing slips, so that the keels of the ships may be received on them transversely of the fixed ways of the slip; and where the extent of frontage is considerable, the carriages used to receive the ships are of several parts, each capable of being moved up and down the fixed ways, and also of being used conjointly with others when the length of ship requires their combined use.

MANN, W. *An improved arrangement of steam-boiler gauge-cocks, and registering apparatus connected therewith.* Dated July 9, 1857. (No. 1912.)

This invention was described and illustrated at p. 49 of No. 1797, of the present volume.

LEWIS, T., H. PARRISH, and R. M. ROBERTS. *Improvements in the separation and extraction of copper from its ores.* Dated July 9, 1857. (No. 1914.)

The object here is the chemical treatment of copper ores, so as to obtain a greater per-centage of pure copper from the ore, and also to render available refuse ore. The ore is carefully assorted, and, if large, broken up into lumps of about two or three inches cube. These are then conveyed to a kiln or furnace, calcined and kept at a dull red heat. After having been sufficiently roasted the ore is drawn from the kiln through a trap underneath, and instantly passed through two pairs of ordinary crushers, the first pair of which will reduce it into small lumps, and the second will pulverise it. Whilst still hot it is next plunged into an acid bath, made of lead or slabs of slate, to stand heat. This tank is placed inside an iron tank containing water, and fire applied to the bottom of the water tank; the solution is to be kept within a few degrees of boiling point. The ore must be kept frequently stirred. When the solution has taken up all the copper it should be drawn off through a filter into a second tank, containing iron to precipitate the copper; the patentees prefer employing boiler plate iron, placed in grooves 3 or 4 ins. apart. The tank is to be kept warm by a low heat under the bottom. When the whole of the copper has been precipitated, the solution may be carefully drawn off into another vessel, and is ready to be rinsed after adding fresh acid. The precipitate left in the tank is then thoroughly cleansed with water, laid upon a drying stove, thoroughly dried, and is then ready for melting.

JOHNSON, W. *Improvements in capstans.* (A communication.) Dated July 9, 1857. (No. 1915.)

These require engravings to illustrate them.

VICARS, T., sen., and T., jun., T. ASHMORE, and J. SMITH. *Improvements in the manufacture of bread, biscuits, and like articles, and in the machinery connected therewith.* Dated July 10, 1857. (No. 1918.)

These consist—1st. In making the crust of bread, biscuits, &c., of a different quality

of dough from that forming the inner part. 2. In the construction of machinery for mixing, rolling, and shaping the dough. The machinery cannot be described without engravings.

PULVERMACHER, I. L. *Improvements in pipes and tubes for smoking.* Dated July 10, 1857. (No. 1919.)

This consists of pipes in which the tobacco smoke is drawn into the mouth from above the burning tobacco, so as not to pass through the unlighted tobacco. Various contrivances, such as pistons, screws, &c., are employed to force the tobacco forward as it is burnt.

KNOWLES, Sir F. C. *Improvements in the manufacture of iron.* Dated July 10, 1857. (No. 1921.)

This consists, 1st, in the employment in the blast furnace of kaolin, together with lime or magnesian lime (quick or stone) as a flax for aiding in producing iron from the ore or cinders, or both. 2d. In the employment in the puddling furnace of kaolin, together with nitrate of soda, nitrate of lime, or nitrate of potash, if desirable, for purifying the iron. When the nitrate of soda or of potash is used, quick lime should be added.

BROOMAN, R. A. *A method of, and apparatuses for scouring or extracting oil and grease from wools and woollen fabrics, and for extracting gum and gummy matters from silk.* (A communication.) Dated July 10, 1857. (No. 1922.)

This consists in the employment of ether, chloroform, alcohol, sulphuret of carbon, liquid carburet of hydrogen, essence of turpentine, benzoin, naphtha, shale oil, &c., in apparatuses whereby they are made to serve over and over again, and whereby the oil or greasy matter is also recovered, which, after being purified and decolorised, is again fit for use. The same solvents are also applied in similar apparatuses to extract the gum or gummy matter from silk.

GILL, J. *Improvements in reaping machines.* Dated July 10, 1857. (No. 1923.)

This invention cannot be described without engravings.

NEWTON, W. E. *Improvements in the construction of furnaces and steam boilers.* (A communication.) Dated July 10, 1857. (No. 1924.)

This chiefly consists in forcing air or steam into the furnace by means of a fan or blower.

SMITH, W. *Improvements in steam engines for giving motion to agricultural implements.* Dated July 10, 1857. (No. 1926.)

This invention was described and illustrated at page 217 of No. 1801 of the present volume.

WOODMAN, W. *Improvements in railroad wheels.* (A communication.) Dated July 10, 1857. (No. 1927.)

This consists in constructing a railroad wheel of two wrought-iron plates, combined with a suitable hub, and united at the flange.

HORNSBY, R., jun. *Improvements in apparatus for hummelling, removing the husks from, and cleansing grain.* Dated July 10, 1857. (No. 1929.)

This consists in mounting on the same shaft with the knives, and throughout the length of the axis, a series of instruments not having cutting edges which stir the grain, and rub it against the cylindrical case of the instrument and also amongst itself.

CHANTER, J., and D. ANNAN. *Improvements in furnaces when moveable bars are used.* Dated July 10, 1857. (No. 1930.)

The object here is to construct long furnaces with moveable bars in two or more lengths, and to give motion to such lengths, either together or independently, by which means comparatively thin bars may be employed with comparatively large air spaces between them.

PRIMARD, E. *Improvements in treating auriferous, argentiferous, or other metallic ores.* Dated July 11, 1857. (No. 1931.)

Believing that each particle of metallic ore has metal (gold, silver, or other) mixed with it, and that in the ordinary processes of extraction much metal is wasted, the patentee roughly crushes the quartz, heats it in a closed kiln, projects water upon it, thus reducing it to a very fine powder, mixes it with crushed schistous or other earths, and submits the mixture to the action of chlorine gas; and the chloride (of gold, say) thus obtained is washed with hot water, and the gold precipitated from the latter by sulphuric acid. The ore—still containing the silver—is placed with chloride of sodium in receivers, subjected to the action of steam for two hours, and from the condensed water the silver is precipitated.

SMITH, W. J. T., and F. TALBOT. *An improvement or improvements in hair-pins.* Dated July 11, 1857. (No. 1932.)

This consists in manufacturing hair-pins from flattened wire, and also in twisting the wire near the middle of each limb of the hair-pin.

RUGG, D. E. *An improvement in water gauges for steam boilers.* Dated July 11, 1857. (No. 1933.)

This relates to a manner of indicating by inspection the actual water level of the boiler, by the ebullition caused in a glass

vessel filled with water, the ebullition being produced from the heat of a metal pipe connected at its top and bottom ends to the steam and water spaces respectively of the boiler; and the water in the metal pipe, being at the same level as that in the boiler, and having no circulation, is comparatively cold, while the steam above it is hot, and causes ebullition in the said glass vessel at the water line, and above that point, as aforesaid; thereby the gauge cocks on the boiler, or on a separate pipe, are dispensed with.

LOACH, J., J. J. SALT, and B. DAY. *Certain improvements in metallic air-tight coffins, as also in the mode of covering, finishing, and ornamenting such like coffins.* Dated July 11, 1857. (No. 1934.)

This consists chiefly in applying to the manufacture of coffins rolled or sheet zinc, the object being the rendering of coffins enduring and perfectly air-tight.

BUROT, F. *A new process for gilding and plating over silk, cotton, wool, and all other textile and fibrous matters.* Dated July 11, 1857. (No. 1935.)

One process consists in arranging the silk, &c., in a tight position, and then immersing them in a solution of acetate of silver, to which is added ammonia, until the solution becomes fluid. After one or two hours' immersion the thread is to be dried and submitted to a current of pure hydrogen gas. The threads are then in a metallic state, and will conduct a current of electricity; they are then to be gilded by the methods usually employed in gilding metals.

LAMY, H. *An engine or apparatus for obtaining motive power by an improved method of applying steam, gas, or heated air.* Dated July 11, 1857. (No. 1938.)

This engine was described at p. 110 of No. 1799, current Vol.

MCKAY, M., and H. F. OSMAN. *Improvements in apparatus for securing the points of railway switches.* Dated July 13, 1857. (No. 1940.)

The object here is to secure close contact of the points of railway switches with the fixed rails when so required, previous to and during the passage of trains over them, so as to prevent the carriages being accidentally turned out of their track; and this is effected by an apparatus composed of a clip or clutch, with space between its jaws to receive the lower parts of the fixed rail and the switch point.

STARR, H. *Improvements in hinges.* (A communication.) Dated July 13, 1857. (No. 1941.)

This relates to hinges used for hanging doors, &c., and, by a simple alteration or addition in the pattern from which they are cast, or in the mode of fitting them together, they may be converted into springs, or reacting hinges, for keeping doors closed or open.

WILLIAMS, N. and T. *Improvements in the form and arrangement of the driving gear of thrashing machines, and in the form and mode of applying the head shakers to such said machines.* Dated July 13, 1857. (No. 1943.)

This consists, 1st, in arranging the driving gear of threshing machines, so as to occupy the smallest possible space compatible with a perfect performance of its purpose, so as to be more easily enclosed in a proper case. 2. In improving the form and mode of applying straw shakers to threshing machines, so that while they will act more effectively they can be placed in any position, that is, at an angle with the fixed or barn work of the machine.

SMITH, P. R. *Improvements in fire-arms and ordnance.* Dated July 13, 1857. (No. 1944.)

This consists in fixing within the fire-arm or cannon a screw-threaded rod of metal which occupies the centre of the bore from end to end. The ball to be used has a screw-threaded hole through its centre, &c. In this way a similar effect is produced to that of rifling. At the bottom of the bore is a chamber of smaller diameter than the rest of the bore, and where the larger bore meets the smaller a shoulder with square edges is left, and on this shoulder the ball (with a flat end) rests. When loading the piece he leaves a space between the ball and the powder, so as to ensure the burning of all the powder.

WHITEHEAD, J. H. *Improvements in milling endless cloths.* Dated July 13, 1857. (No. 1945.)

These consist in supporting one end of the axis of the lower roller by a bracket passing under the lower roller, so that the endless cloth may pass under the bracket, and thus facilitate the removal of the endless band of cloth without the necessity of separating the ends.

NEWTON, W. E. *Improved machinery for converting old rope or cordage into tow.* (A communication.) Dated July 13, 1857. (No. 1946.)

Here the rope to be operated upon is first to be cut into pieces of suitable lengths and untwisted. The rope is then fed into the improved machine by which it is converted into tow. For this purpose it is placed in guides furnished with gills or pins, by which it is conducted between drawing rollers; from these it is taken by a large rotating cylinder provided with gills

or pins, on which the fibres are held down by the pressure of a current of air produced by fans, and the fibres are consolidated by rotating brushes.

NEWTON, W. E. *Improvements in the manufacture or reduction of platinum.* (A communication.) Dated July 13, 1857. (No. 1947.)

Here the platinum ore to be operated upon is mixed in a state of division with lime, baryta, or strontia, magnesia, or other carbonates. This mixture, on being roasted in the open air, will be deprived of the greater part of the osmium which it contains. The ore is afterwards melted in vessels, the inside of which are lined with lime, baryta, strontia, magnesia, or the carbonates of these bases, and this fusion is effected by means of a combustible gas in combination with oxygen.

NEWTON, W. E. *An improved construction of portable railway for steam traction engines on common roads or lands.* (A communication.) Dated July 13, 1857. (No. 1948.)

This consists in constructing the railway of two endless chains of short rails, jointed together vertically and laterally, or horizontally, and working over quadrilateral pulleys mounted in adjustable frames, and so arranged that, as the engine is propelled along, the rails are laid down in front, and form in effect a continuous line of railway for the wheels to travel over.

NEWTON, W. E. *An improved mode of preventing incrustation in steam-boilers.* (A communication.) Dated July 13, 1857. (No. 1949.)

For the above purpose the dark (or which is commonly called the black) gum catechu is employed. It is not necessary to use more gum catechu than is barely sufficient to keep the water tinged to a light reddish-brown colour.

NYE, S. *Improvements in chaff-cutting machines.* Dated July 14, 1857. (No. 1950.)

This consists in passing the spindle for putting in motion the necessary wheels for drawing different lengths of cut through the rollers, independent thereof. The patentee also claims the use of india-rubber as a means of compression.

CALVERT, F. C., and C. LOWE. *Improvements in the manufacture of size.* Dated July 14, 1857. (No. 1953.)

This consists in the use of calcined amylaceous substances, salts of soda, potash, ammonia, magnesia, and mucilage, as a substitute for animal size in stiffening, sizeing, preparing, and finishing yarns, textile fabrics, paper, &c.

HIBBLETHWAITE, H., W. SHUTTLEWORTH, and W. TASKER. *Improvements in preparing yarns for, and in machinery or apparatus employed in printing yarns for, carpets or other similar fabrics.* Dated July 14, 1857. (No. 1954.)

This consists, 1st, in making the steeping cistern with a perforated false bottom, and fixing under it a layer of serge to act as a filter. 2. The patentees dispense with the cutting of notches in the division or index plate now used for dividing the circumference of the printing drum into equal parts, by having the rack or segment wheel made with the same number of cogs as they wish to have divisions in the periphery of the drum, and they apply a pall or catch thereto with one or more cogs formed thereon, which fit into any of the spaces between the cogs of the segment wheel, thereby holding the drum in any desired position for the proper laying on of the colours. 3. They apply a brake to the rim of the drum actuated by levers and weights. 4. They employ an adjustable self-acting index plate, or indicator, which stops the drum at any desired number of revolutions. 5. They apply the brake or drag to the spindle instead of the bobbin. 6. They arrange the colour-carriage to slide freely upon two or more pins or studs in long bosses, which are parallel with each other, so as to obtain a perfectly parallel and steady motion. 7. They employ a board with holes or eyes for the thread to pass through, and place it between the bobbins and the guide eyes, to prevent any broken threads falling on the rotating bobbins, and thereby becoming entangled with them; and, 8. They dispense with the frame now used for holding the design-board, by having slots cut horizontally at the top and bottom of the board itself, to adjust and fasten the scale to it.

WEBSTER, J. *An improvement or improvements in safety-valves.* Dated July 14, 1857. (No. 1955.)

This invention cannot be described without engravings.

CLARK, W. S. *Improvements in machines for harvesting grain and grass crops, and in the automatic delivery thereof.* (A communication.) Dated July 14, 1857. (No. 1956.)

The patentee claims certain described methods of effecting the following objects. 1. The raising the rake of a self-raking reaping machine up in a direct line from the grain after raking it from the platform, and, when thus raised, holding it suspended above the clear of the grain until the rake has returned to the front of the machine to repeat its operation. 2. Placing the return movement of the rake when so raised and

suspended under the control of the driver. 3. Operating the raking attachment in one direction by locking it with the main shafts, and in the other direction by means of a spring. 4. Inclining the rake to the vertical to correspond with the length of grain being cut, and raising it in the plane into which it is inclined. 5. The application of the power by which the machine is drawn to a point of the wheel frame beneath the level of the axle when the hounds are connected with the frame or the axle. 6. Balancing the draught pole by the weight of the driver.

HARDING, G. P. *Improvements in the manufacture of hats, caps, and other coverings for the head.* Dated July 14, 1857. (No. 1959.)

This invention was described and illustrated at p. 203, No. 1803, current volume.

ASHTON, T. *An improvement in teasing, scribbling, carding, and combing engines.* Dated July 14, 1857. (No. 1960.)

This consists in so constructing the server, and the rollers connected with it, as to give them, in addition to their former rotary motion, a to-and-fro or cross motion from right to left, and from left to right.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

MACNICOL, J. D. *Improvements in machinery or apparatus for cylinder printing.* Dated July 9, 1857. (No. 1907.)

The inventor proposes to make the "doctor" of a solid piece of metal, with bushes at each end, so that when it comes in contact with the copper rollers it will not give way so as to make scratches, &c. By this kind of a doctor he is able to print blotch grounds as well as white grounds by the machine. By this doctor, being made the whole width of the copper roller, he is enabled to print solid the whole width of the cloth, if desired.

BROOMAN, R. A. *An improvement in propelling ships, boats, and other vessels.* (A communication.) Dated July 9, 1857. (No. 1910.)

This consists in fitting to the ship two submerged wheels, fitted with blades, and placed horizontally. The wheels are within semi-cylindrical cases, enclosing one-half of them, and are made to rotate by cranked arms worked by the piston-rod of a steam-engine. To propel the vessel the wheels are driven in reverse directions,—to steer her, in the same direction.

LOGIE, C. *An improvement in, or addition to, fire-arms.* Dated July 9, 1857. (No. 1911.)

The object here is to provide troops, &c., with a ready means of tearing open the end of the cartridge. It consists in applying to the outside of the barrel of the fire-arm, near its muzzle end, a projecting hook or claw formed with teeth on its inner edge.

DELMAS, F. *Improvements in ventilating ships, mines, and other places.* Dated July 9, 1857. (No. 1913.)

Here the interior of the ship is furnished with pipes pierced with holes. These pipes are adapted to receivers placed in communication with the exterior column of air through which the ship passes, and each receiver, by the forward motion itself of the ship, receives a column of air which is carried and distributed in the interior of the pipes.

EASTWOOD, E. *Improvements in picker bands for looms.* Dated July 10, 1857. (No. 1916.)

These bands are made of metal, and joints or hinges are constructed in them, so that they will give way to the joint action of the picker and picker stick.

DE BERGUE, C. *An improvement or improvements in the manufacture of apparatus for condensing and cooling purposes.* Dated July 10, 1857. (No. 1917.)

This relates to modes of constructing air-tight, water-tight, and steam-tight joints or connections in tubular condensing and cooling apparatus, between the pipes or tubes and the chambers to which the pipes and tubes are connected.

HOFE, D. *An improved method of preventing one train from running into another on railways.* Dated July 10, 1857. (No. 1920.)

See p. 132, No. 1774, Vol. 67.

MOON, J., R. BELT, and G. EWBANK. *An improved agricultural implement.* Dated July 10, 1857. (No. 1925.)

This relates to a double-action spiked land roller or clod-crusher, and consists of two cylinders, mounted horizontally upon a metallic frame and bearings, and furnished with projecting spikes upon their peripheries, so as to break the ground by their revolving action when in use, the spikes moving between and in advance of each other upon the rollers, whilst travelling wheels are employed for raising or lowering the apparatus when required.

DYSON, G., and T. HARRISON. *An improvement or improvements in steam engines.* Dated July 10, 1857. (No. 1928.)

The inventors attach to any steam engine a condensing chamber, at an elevation above the height to which water will rise in vacuo under the pressure of the atmosphere. In communication with this chamber they place a pipe leading from the exhaust valve

of the engine; also a pipe for the conveyance of cold water, and a descending pipe for carrying away the waste water. They place the outlet of the waste water pipe (provided with a suitable valve) in the hot well or in a cistern of water. The waste steam will be conducted from the exhaust valve to the condensing chamber, and there be condensed by throwing in a jet or jets of cold water, and thus a vacuum is formed without the aid of an air pump.

FONTAINEMOREAU, P. A. L. DE. *An improved boot and shoe scraper or cleaner.* (A communication.) Dated July 11, 1857. (No. 1936.)

This consists in forming the scraper for boots and shoes of a number of pieces of hard leather, cut out similar to the form of a hand. The lower part has holes punched in it, through which a wire is passed. A number of these pieces of leather are passed on the wires, side by side, in rows, and between each piece a washer of leather is placed to separate them. The whole are fixed together by rivetting the wires to a metallic plate at each end of the scraper or cleaner.

DENIZOT, B., and C. FLIPPS. *An improvement in the construction of railway brakes.* Dated July 11, 1857. (No. 1937.)

This brake consists of a bar having a hole with a female screw at each end, which bar can be attached to, or removed from, the axles of the wheels when required. On the axis of each wheel is a male screw. The brake bar is held in the position to allow the axles to rotate by a hook on a moveable arm. To apply the brake bar, the cylinder is turned, on which is wound the chain of the coupling rod, and by this means a detent sets free the hook of the moveable arm, when the brake is immediately forced by springs against the mail screw, which enters the female screw of the brake bar, and thus locks the wheels.

DEPINHAY-PREHAMON, A. A. N. *Improvements in wind-mills.* Dated July 11, 1857. (No. 1939.)

This consists, 1st, in the arrangement of a mill or moving wheel with a vertical axis. 2d. The establishment of a funnel or air collector, which directs a greater quantity of air on some of the vanes of the mill, and protects the others at the opposite diameter from the action of the wind, in order to diminish the counter resistance at that side.

HINKS, J. L., and J. R. DAY. *Improvements in locks and latches, and in attaching lock and latch knobs to spindles.* Dated July 13, 1857. (No. 1942.)

These consist in constructing a lock in which a central tube, into which the key enters, is surrounded by a series of parallel tubes, in each of which is a rod pressed upwards by a spring. At the top of the tubes is a fixed plate, and a similar plate is fixed at the bottom of the tubes. The rods engage in holes in the upper plate, and prevent the central tube from turning, but when the key is introduced, and pushed home, it disengages the rods from the plate, and the key and central tube can turn and act on the bolt.

URRY, B. *Improvements in seed-drills.* Dated July 14, 1857. (No. 1951.)

These refer—1st, to an arrangement for changing the speed of seed box gearing. 2. To a mode of throwing the whole of the working apparatus out of action.

WYATT, W. *Improvements in haymaking machines.* Dated July 14, 1857. (No. 1952.)

This consists mainly in a mode of adjusting the distance of the forks from the ground; in placing the fork barrels further behind the driving wheels than customary; in providing a loose sliding grooved pinion for reversing the motion of the fork barrel; and in having the tops or ends of the forks in the form of a single tine flattened out.

KINGSLEY, J. *Obtaining or applying a primary motive power, namely, the water of a river, which causes a vacuum in an exhausting receiver, which may be transferred by tubes to other machines, causing water and ores to be raised from mines, likewise causing the steam-engine to be superseded, water being cheaper than coals.* Dated July 14, 1857. (No. 1957.)

See *Mechanics' Magazine*, p. 277, No. 1780, Vol. 67.

SMITH, H. and F. M. *An improvement in fire-arms.* Dated July 14, 1857. (No. 1958.)

This consists in fitting to ordinary guns a nipple, so constructed, that upon the hammer striking it, it shall be forced into the barrel, and be made to penetrate the cartridge sufficiently to cause the discharge thereof.

PROVISIONAL PROTECTIONS.

Dated February 6, 1858.

221. Theodore Waraksine, of Russia. Sorting corn by its weight by means of a special machine, called "Specific Corn-sorting Machine."

Dated March 11, 1858.

488. Richard Roberts, of Manchester, civil engineer. Improvements in mechanism for engraving, and otherwise copying in line, paintings and other designs on flat and curved surfaces of metal, paper, and other materials.

Dated March 13, 1858.

514. John Jameson, of Gateshead. Improvements in apparatus for compressing and expanding æriform fluids.

Dated March 15, 1858.

520. Richard Edwards, of Single-street, Mile End-road. Improvements in preparing and combining materials used in lighting or kindling fires.

Dated March 18, 1858.

550. Lavington Evans Fletcher, of Upper Norwood. Improvements in marine engines and boilers, and their appurtenances.

552. Charles Doley, of Birmingham, manufacturer, Edwin Bigland, of Smethwick, Stafford, designer, and Thomas Henry Worrall, of Smethwick, lithographer. Improvements in ornamenting metals.

554. Sir James Caleb Anderson, of Fermoy, Ireland, Baronet. Improvements in locomotive and other carriages.

556. Thomas Suffield, of Bermondsey, brass-founder and plumber. Improvements in pumps, especially adapted for ships' purposes.

558. Thomas Stephen Sutton, of Glynlciros, Neath, Glamorgan. Improvements in miners' lamps.

560. Alfred Vincent Newton, of Chancery-lane. An improved process of polishing, blueing, and annealing articles of iron and steel. A communication.

562. Joseph Antoine Jean Redier, of Paris, watch-maker. An improved chronometer, called "Chronoscope."

Dated March 19, 1858.

564. Henry Brocklebank, of Coventry, watch-maker. Improvements in chronometers, watches, and time-keepers.

566. Marc Antoine François Mennons, of Paris. Certain improvements in the production of motive power. A communication.

568. George Williams, of West Bromwich, Stafford, forge and mill manager, and Edward Rowley, of West Bromwich, iron roller. An improvement or improvements in piling iron.

570. John Matthew May, of Lambeth-hill, City, importer. Improvements in fastenings for porte-monnaies, travelling bags, ladies' companions, cigar, writing, and instrument cases, fusee boxes, and other like cases or receptacles. A communication from J. Moench and Co.

572. George Frederick Muntz, of Frenchwalls, near Birmingham. Improvements in mixing zinc with copper and other metals.

574. John Bramwell, of Buxton, Derby, engineer. Improvements in apparatus for the prevention of accidents arising from the escape of gas.

Dated March 20, 1858.

576. William Haigh, of Reddish, Lancaster, paper-maker. Improvements in the manufacture of a certain description of paper, and in the machinery connected therewith.

578. Perceval Moses Parsons, of Duke-street, Adelphi, and William Dempsey, of Great George-street, Westminster, civil engineers. Improvements in the construction of switches and crossings for railways.

580. James Brooks, of Elton, Lancaster. Improvements in drawing frames, used in the manufacture of cotton and other fibrous materials.

582. Patrick Browne, of Liverpool, engineer. Improvements in the screw-propeller, partly applicable to the raising of fluids.

584. William Allen, of Birmingham. Improvements in machinery for manufacturing screws.

586. Alfred Vincent Newton, of Chancery-lane. Improvements in sewing machines. A communication.

Dated March 22, 1858.

590. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., Patent Agent. Improvements in apparatuses for exhibiting daguerreotype, photographic, and other stereoscopic views and pictures. A communication.

591. Edward John Manwaring, of Lee, Kent, gentleman. Improvements applicable to stereoscopic apparatus.

592. James Thomas, of Hackney, engineer. Improvements in machinery for counting and registering or paging.

593. Charles Cheetham Bailey, of Manchester, gentleman. An improved method of supplying the feed water to boilers, and in the apparatus connected therewith.

595. John Juckes, of Dame-street, City-road. Improvements in apparatus for supplying coals to stoves and fire-places.

597. Isaac Holden, of St. Denis, France, manufacturer, and Emile Hubner, of Mulhouse, engineer. Improvements in preparing, heckling, or combing flax, silk, wool, and other fibres.

599. Henry Alfred Jowett, of Sawley, Derby, civil engineer. Improvements in machinery for transmitting telegraphic communications and making signals, applicable to railways and other purposes.

Dated March 23, 1858.

600. Henri Laurent Müller, of Paris, printer. Improvements in chromographic printing.

601. Charles Atherton, of H.M. Dockyard, Woolwich, civil engineer. Improvements in furnaces, fire-grates, and stoves.

602. Alexander Southwood Stocker, of Wimpole-street, Cavendish-square, manufacturer. Improvements in the manufacture of railway axles and tubes.

603. William Mould, of Bolton, dresser. Improvements in machinery or apparatus for preparing and spinning fibrous materials.

604. John Rowbottom, of Halifax, York, gas engineer, and Thomas Standeven, of the same place, millwright. Improvements in washing, wringing, and mangling machines.

605. William Edward Wiley, of Birmingham, pen and pencil manufacturer. Improvements in ever-pointed pencils.

606. Charles Clifford, of the Inner Temple-lane. Improvements in ships' davits, and in apparatus for stowing, lowering, and securing boats.

607. Eugène Coulon, of Croisset, France. Improvements in preventing the incrustation of steam boilers. A communication.

609. William Saxby Keith, of York-street, Southwark, surgical instrument maker. An improved rotatory cutting machine.

610. Charles Francis Quintin, of Cheltenham. A kneading machine.

611. William Ramsell, of Deptford, foreman. Improvements in furnaces and fire-places.

Dated March 24, 1858.

612. John Crawford Wilson, of Soley-terrace, Pentonville. An improved method for introducing elastic substances into articles of wearing apparel, and the adaptation thereof to the manufacture of certain useful garments in which elasticity is required.

613. Richard Jackson, of Garstang, Lancaster, cotton spinner. Improvements in machinery or apparatus for spinning cotton and other fibrous substances.

614. Henry Gerner, of Newton-road, Bayswater, civil engineer. Improvements in apparatus for the manufacture of gas from oils, or fatty or resinous matters.

615. Charles Chevallier, Mark Isidore Olivier, and Eugène Rolland, all of Brussels. A machine for making and applying as soles to shoes and

boots, gutta-percha, caoutchouc, and other analogous substances adapted for that purpose.

616. Marc Antoine François Mennons, of Paris. Certain improvements in the construction of heating apparatus. A communication.

619. Constantine Nicolaus Kottula, of Liverpool, soap manufacturer. An improvement in the manufacture of neutral hard or skin soap.

620. George Arthur Biddell, and William Balk, both of Ipswich, engineers. Improvements in steam boilers.

621. John Frederick Brinjes, jun., of Fieldgate-street, Whitechapel, and Henry Joseph Collins, of West-hill, Wandsworth, architect. Improvements in the manufacture and reburning of animal charcoal.

623. Jean Vanden Hielakker, engineer, of Brussels. An improved machine for compressing coal, other fuel, and substances requiring pressure.

Dated March 25, 1858.

625. William Stettinius Clark, of Atlas Works, Upper Park place, Dorset-square. Improvements in the construction of railways. A communication from S. A. Beers, of New York.

626. David A. Hopkins, of Paterson, New Jersey. Improvements in journal boxes.

627. William Crook, of Blackburn. Improvements in looms.

628. James Nuttall, of Walmersley, Lancaster, pattern designer. Improvements in looms.

629. George Henry Ellis, of New Malton, York, ironmonger. Improvements in kitchen ranges.

630. William Edward Newton, of Chancery-lane. Improvements in the means of, and lamps for burning certain kinds of oils and hydrocarbons. A communication from F. Jacquemart, of Paris.

631. François Haeck, of Brussels, gentleman. Improvements in pumps for pumping beer, wine, vinegar, oils, or other liquids, containing acids or oily matters. A communication.

632. Felix Foucou, of Paris, civil engineer. Improvements in steam boiler and other furnaces.

633. Westley Richards, of Birmingham, gun manufacturer. Improvements in breach-loading guns and fire-arms.

635. William Robjohn, of Stanhope-street, Hampstead-road, organ builder. Certain improvements in organs.

636. François Auguste Chevallier, of Paris. Improvements in photographic apparatus.

Dated March 26, 1858.

637. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., Editor of the *Mechanics' Magazine* and Patent Agent. Improvements in weighing machines. A communication from P. A. Brussaut.

639. Pierre Hippolyte Gustave Bérard, of Paris. Applying concentrated collodion to the effect of superseding caoutchouc in waterproofing stuffs of all descriptions for manufacturing garments and wearing articles, and also for applying it over painted surfaces instead of varnish.

641. Joshua Horton, of Smethwick, Stafford, manufacturer. An improvement or improvements in the construction of the girders used in the guide framing of gas holders.

643. Henry Doulton, of Lambeth. An improvement in the manufacture of invert blocks used in constructing sewers and drains.

645. William Edward Newton, of Chancery-lane. An improved machine for performing the addition of numbers, quantities, or sums of money, to be termed the "arithmometer." A communication.

Dated March 27, 1858.

647. John Newman and John Frederick Newman, of Regent-street, opticians. Improvements in spectacles.

649. Edgar Chichester Jones, of Caroline-street, Bedford-square, civil engineer. Improvements in railway brakes.

651. Benjamin Burrows, of Leicester. Improvements in weaving webs or narrow goods, and in ornamenting elastic webs.

653. James Welch, of Southall. Improvements in portable railways, and in the means of their application to carriages to facilitate their movements on common roads and other surfaces.

655. William Armand Gilbee, of South-street, Finsbury. Improvements in treating saccharine fluids. A communication.

Dated March 29, 1858.

657. William Armand Gilbee, of South-street, Finsbury. Improvements in treating brandies and other spirituous liquids for improving their quality. A communication.

659. John Robert Breckon, of Darlington, colliery manager, and Robert Dixon, of Crook, Durham, mechanical engineer. Improvements in the construction of coke ovens.

661. John Frederick Spencer, of Adelaide-place, London Bridge, marine engineer. Improvements in marine engines.

663. John Baillie, of Vienna, civil engineer. An improved construction of coiled spring.

665. Isaac Brown, of Carlisle, and John Brown, of Notting-hill, merchants. Improvements in the manufacture or production of manure.

667. Edmond Auguste Jacquin, of Ste. Opportune, Paris. An improvement in preparing plates for printing. A communication from H. Garnier, of Paris.

669. William Harding, of Forest-hill. Improvements in revolver fire-arms and in apparatus for manufacturing projectiles.

Dated March 30, 1858.

671. Jean Claude Durand, of Pimlico, engineer. Improvements in the manufacture of iron.

673. Thomas Silver, of Philadelphia, U.S., gentleman. Pulsating valves or governors.

675. Benjamin Wood, of Huddersfield. Improvements in machinery or apparatus for cleansing the waste of woollen or other fibrous manufactures.

677. William Edward Newton, of Chancery-lane. Improvements in the manufacture of sheet iron. A communication.

Dated March 31, 1858.

679. Frederick Albert Gatty, of Accrington, Lancaster, manufacturing chemist. Improvements in treating certain compounds containing the colouring matter of madder.

681. Marcus Brown Westhead, of Manchester, merchant, and Hugh Baines, of the same place, gentleman. Certain improved apparatus for coupling or connecting carriages, wagons, trucks, vans, and engines, used or employed upon railways.

683. Edward Henri Todé, of Peckham, printer. Improvements in apparatus for generating steam in steam-boilers by means of gas.

685. Bland W. Croker, of Vienna, civil engineer. Improvements in axle boxes to render them self-lubricating.

687. Frederick and William Edwards, of Coventry, machinists. Improvements in weaving.

689. John Henry Johnson, of Lincoln's-inn-fields. Improvement in articles of buoyancy to be used either for swimming or for the saving of life from drowning. A communication from P. Mazard and Co., of Lyons.

691. Robert Barr, of Glasgow, engineer. Improvements in machinery or apparatus for making rivets, spikes, nails, and screw blanks, and similar articles in metal.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," April* 13, 1858.)

2972. T. Kaye. Improvements in looms for weaving.

2989. J. Eccles. Improvements in drying and coloring, or ornamenting bricks, tiles, pipes, and other articles made of plastic earths.

2991. W. Bird and T. Bird. Improvements in looms and pickers for looms.

2998. L. F. E. Ciceri. Improvements in the preparation of white as a basis of colour.

3004. W. Parsons and J. Attree. An improved cock or tap and flushing apparatus.

3006. A. Ripley. Improvements in mills for grinding myrabolams, valonia bark, and other similar substances.

3011. S. H. Sewers. An improved powder for dusting turnips, and machinery for distributing the same, which may be employed for similar useful purposes.

3012. J. Grizard. Improvements in watches and in the means of or for winding up and setting watches.

3013. W. Standring. An improved throstle and mule-spring for the under-clearers of spinning machines.

3018. W. Mercer, W. Bodden, and W. Higginson. Improvements in certain parts of machinery for slubbing and roving cotton.

3030. J. Harris. Improvements in signalling and in apparatuses employed therein, part of which is applicable to the compression and exhaustion of air and other fluids.

3032. G. Holcroft and G. Denholm. Certain improvements in steam engines.

3033. B. Shaw. An improvement or improvements in the construction of windows.

3041. R. A. Brooman. Improvements in cocks and valves for regulating the flow of fluids. A communication.

3046. J. Smith. Certain improvements in securing rails in their respective chairs for railroad permanent ways.

3078. J. Bradley. Improvements in ovens applicable for baking bread and pastry, roasting or cooking meats, and similar purposes.

3083. W. and J. Galloway. Improvements in hydraulic presses.

3092. H. Gregory. Certain improvements in machinery or apparatus for making lozenges or other similar articles.

3118. R. Furnival. Certain improvements in machinery or apparatus for cutting paper, cardboard, and other similar articles.

3119. W. Walker. An improved apparatus for the purposes of heating and drying.

3132. G. T. Bousfield. Improvements in machinery used in the manufacture of springs, and in the application of springs to carriages. A communication.

3160. G. W. Hart. Improvements in the construction of locks and in apparatus for cutting keys.

3174. H. Desmoutis. New metallic alloys.

3176. J. T. Griffiths. Improvements in the manufacture and ornamenting of lace.

3184. J. Blake and R. D. Kay. An improved apparatus for reducing and regulating the quantity, force, or pressure of steam.

3191. A. V. Newton. Improved machinery for cutting corks and bungs. A communication.

14. J. and J. H. Ellis. Improvements in machinery for subdividing or reducing into small particles masses of rock and minerals.

84. W. Waller. Improvements in machinery for grinding, bruising, breaking, and cutting cereals, grasses, and other vegetable substances.

98. C. and T. Davage. Improvements in railway crossings.

153. L. Caemmerer. Improvements in the apparatus for cleaning the top rollers and fluted rollers of the different spinning machines.

183. J. Haste. Improved apparatus for preventing the explosion of steam boilers.

214. E. and T. Collingwood. Certain improvements in machinery or apparatus for propelling vessels on water.

221. T. Waraksine. Sorting corn by its weight by means of a special machine called "specific corn sorting machine."

235. T. B. Daft. Improvements in instruments for rubbing out pencil marks and for sharpening pencils.

302. P. Heyns. Improvements in wheels and axle-boxes.

341. W. Hall. Improved apparatus for working railway brakes.

362. J. Henderson. Improvements in shells or explosive projectiles.

372. A. Applegath. Improvements in printing machinery.

478. F. C. Warlich. Improvements in apparatus for generating steam.

482. H. Dauphin. A new or improved machine for giving to metallic bands a circular or partly circular form.

522. R. A. Brooman. Improvements in sewing machines. A communication.

548. W. Ward. New or improved machinery for the manufacture of nails, spikes, bolts, rivets, screw-blanks, and nuts.

560. A. V. Newton. An improved process of polishing, blueing, and annealing articles of iron and steel. A communication.

565. G. Scott. Improvements in generating elastic fluids, and in apparatus for that purpose.

597. I. Holden and E. Hubner. Improvements in preparing, heckling, or combing flax, silk, wool, and other fibres.

605. W. E. Wiley. Improvements in ever-pointed pencils.

614. H. Gerner. Improvements in apparatus for the manufacture of gas from oils, or fatty or resinous matters.

633. W. Richards. Improvements in breech-loading guns and fire-arms.

655. W. A. Gilbee. Improvements in treating saccharine fluids. A communication.

657. W. A. Gilbee. Improvements in treating brandies and other spirituous liquids for improving their quality. A communication.

675. B. Wood. Improvements in machinery or apparatus for cleansing the waste of woollen or other fibrous manufactures.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

784. William Ricketts and Thomas Bulley.
785. Samuel Fielding, jun.
789. John Henry Johnson.
801. Samuel Holt.
802. George Fergusson Wilson, Conrad Abben Hanson, and James John Wallis.
805. James Lee Norton.
819. Thomas and Jonas Wimpenny.
823. George Turner.
835. Edward Hammond Bentall.

LIST OF SEALED PATENTS.

Sealed April 9th, 1858.

2589. John Harland.
2598. George Frédéric Lombard.

2599. Alfred Barlow.
2601. Robert Porter and James Porter.
2605. Franklin Prestage.
2607. George Beard.
2609. William Calvert.
2671. Michael Henry.
2677. David Patridge.
2685. Isaac and John Henry Storey.
2713. Charles de Clippèle.

Sealed April 13th, 1858.

2612. William Brookes.
2617. John Harwood Simpson.
2625. John Field Swinburn.
2629. John Middleton and William Rylance.
2630. Thomas Restell.
2631. Joseph Parker.
2632. John Croft Plomley.
2634. Edward Wilkins.
2637. Robert Glass Balderston.
2641. Henry Angelo Ludovico Negretti and Joseph Warren Zambra.
2642. Joseph Gibbs.
2643. Paul Heilmann.
2646. George Scarr and James Pollard.
2651. Julian Bernard.
2656. Richard John Badge.
2683. John Henry Johnson.
2690. Charles Reeves.
2751. Jonas Craven.
2762. Thomas Symes Prideaux.
2921. Henry Bessemer.
2978. James Howard.
3000. Robert Hazard.
3053. Samuel and Joshua Biggin.
3156. Charles Reeves.
130. Jonas Craven, Wignall Hey, and Charles Worsnop.
133. Jean Jacques Huber.
272. Alfred Vincent Newton.
288. William Cope.
299. Charles Monson.

* The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICE TO CORRESPONDENTS.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

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HALL'S PATENT RAILWAY BREAK APPARATUS.

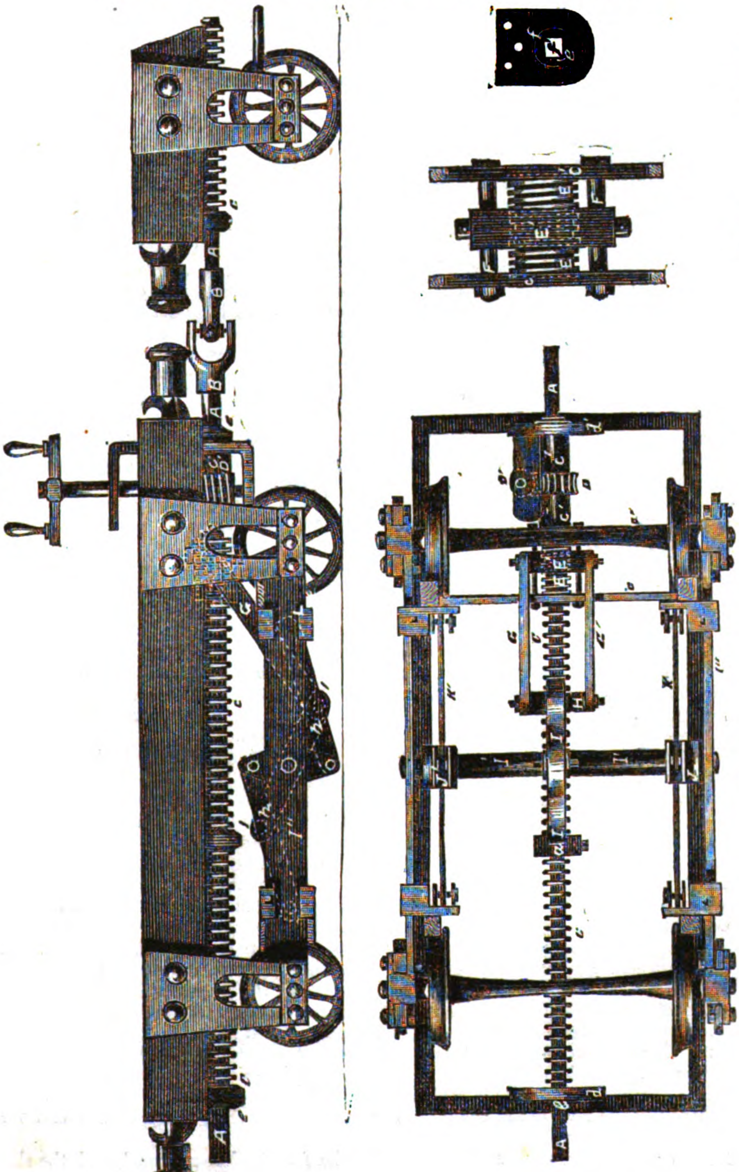


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

HALL'S PATENT RAILWAY BREAK APPARATUS.

Mr. Walter Hall, of the India Rubber Works, Steam Mills, Borough-road, whose mechanical skill has enabled him to effect important improvements in more than one description of machinery, is bringing forward a very promising apparatus for working railway breaks. This apparatus consists, first, of a series of rods cleverly contrived and connected throughout the length of the train; next of parts for imparting a rotary motion to this series of rods; and lastly, of certain well-arranged contrivances for transmitting motion from these rods to the breaks of any desired number of break vans or carriages. The apparatus used is simple in its construction, certain in its action, and unattended by any great expense or trouble in its construction and operation. The engravings on the preceding page illustrate Mr. Hall's invention. Fig. 1 is a side elevation of the frame of a break-carriage, and of a carriage which is not furnished with breaks, but to which the rod by which the breaks are worked is applied in order to complete the connection of the breaks throughout a train. Fig. 2 is a plan of the underside of the break carriage. A, A, are longitudinal square bars or rods, one of which is fitted to each carriage or truck throughout the train, and which are connected by means of universal joints, B. The ends of the rods, A, A, enter the square sockets of the universal joints, B, B, and are of such a length that when the train is extended to its greatest length they shall not be withdrawn from the said sockets. Upon each of the rods, A, A, is placed a shoulder, *a*, which may either be formed upon it or set fast by a set-screw, and on either side of this shoulder is placed a helical spring, C, which bears at one end against the end of the screw-threaded collar, E, in the plate, *c*, and at the other end against a similar collar in the plate, *d*, and offers a certain amount of resistance to the motion of the rod, A, in either direction. In the event of a concussion taking place upon the train, or between the parts of the train, these springs, C, C, will receive the shock gradually, and prevent, or aid in preventing, injury to the train.

It will be seen that by imparting rotary motion to any one of the rods, A, A, motion will be communicated by means of the universal joints, B, B, to all the remaining rods throughout the train, and if the breaks of the several break-vans or carriages be suitably connected to the said rods they will be all brought simultaneously into action upon their respective wheels. Now, in order that the rod, A, may, on force being applied to it, turn freely, it is supported in the plates, *d*, *d'*, (which are secured to the carriage-frame in the positions shown in Figs. 1 and 2), by means of collars, *e*, *e*, which are shown in the end view in Fig. 3. These collars, *e*, *e*, turn freely in the circular holes, *f*, *f*, and have in them the square holes, *f'*, *f'*, through which the shaft, A, passes, and which it fits. Between the plates, *c'*, *d'*, the shaft, A, carries a collar, C', furnished with holes, as shown, to receive lubricating matter. This collar, C', has fixed upon it the worm-wheel, D, which is put in motion by the worm, D', the shaft of which is furnished with handles in the usual manner. The worm-wheel, D, is formed with a concave edge, and is in gear with the worm, D'. On turning the handles the worm, D', the worm-wheel, D, the collar, C', and therefore the shaft, A, will evidently be put in motion.

We have now to explain the manner in which the motion of the shaft, A, is transmitted to the breaks. Between the plates, *c*, *c'*, is placed upon the shaft, A, and so as to turn with it, a screw-threaded collar, E, which has circular ends in order to fit into holes in the plates, *c*, *c'*. The male threads of this collar, E, work within corresponding female threads within the nut or block, E', and through holes in the said nut or block, E', the guide rods, F, F, are placed, the latter being secured to the plates, *c*, *c'*, by nuts, as shown. An enlarged plan view of the collar, E, the block, E', the guides, F, F, and the plates, *c*, *c'*, is shown in Fig. 4. The ends of the block, E', have pinned upon them the levers or rods, G, G', and the other ends of these levers or rods are carried by a pin or bolt, H, which also carries at the middle of it one end of the double rocking lever, I. This lever, I, is keyed at its centre upon a cross shaft, I', which is supported near each end by the side bars, I'', I''. Within the said side bars the shaft, I', has secured upon it two other double rocking levers, J, J', one in each side of the carriage. These levers are slotted to receive the ends of the break levers, K, K, K', K', which are pinned to them as shown at Fig. 2. The other ends of these break levers have the break blocks, L, L, pinned to them, and these break blocks slide open, and are guided by the side bars, I'', I'', as usual, and as shown in the figs. The double rocking lever, I, is slotted at *h*, *h*, in order that the break apparatus may be reversed in the event of the van or carriage being turned end for end, as will be hereafter explained.

The action of the parts is as follows:—On the handles being turned, and the shaft, A,

thereby being made to rotate, as before described, the screw-threaded collar, E, is caused to rotate, and thus impart motion in a longitudinal direction to the block, E′, either forward or backward, according to the direction in which the handles are turned. We will suppose them to be so turned that the block, E′, shall be made to move from back to front, or from left to right. In moving thus the block, E′, will draw forward the levers, G, G′, and thus by means of the rocking lever, I, will impart a partial rotary motion to the shaft, I′, which again will set in motion the levers, J, J′, and therefore the break levers, K, K, K′, K′, and thus press the break blocks, L, L, against the wheels. On turning the handles in the reverse direction the whole of the motions just described will be reversed, and the break blocks withdrawn from the wheels.

It is evident that since the handles of the one worm shaft impart rotary motion to the whole of the shafts, A, A, throughout the train, the whole of the breaks throughout the train will be simultaneously put into and out of action if each of the break vans or carriages be provided with the apparatus just described.

In order to enable the break apparatus of any break-van or carriage to be prepared to operate after the van or carriage has been reversed, or turned end for end, in its position on the line, or in a train, it will only be necessary to disconnect the pin or bolt, H, from that end of the lever, I, to which it is attached, and to connect it to the opposite end of the said lever after the latter has been turned around the shaft, I′, in such manner as to keep the break blocks in the same relation to those of the other carriages as before.

By placing pins through the several shafts, A, A, within the universal joints the said shafts and joints would act as couplings, and keep the carriages connected in the event of the ordinary connexions giving way. With this arrangement guard chains might be dispensed with.

THE PADDLE-WHEEL AND SCREW-PROPELLER.

On the evening of Wednesday, April 14, J. Macgregor, Esq., barrister-at-law, read at the Society of Arts a highly interesting paper on the paddle-wheel and screw-propeller, containing the results of much careful research. We shall not attempt to give the history compiled by the author, which embraced references to nearly all the patents ever taken out for propelling apparatuses; but content ourselves with recording the more novel and prominent facts brought forward.

Several modern writers state that the paddle-wheel was used by the ancient Egyptians, but the author can find no proper evidence to warrant this assertion. The wheel of a chariot in an old Egyptian painting of a boat has often been mistaken for a paddle-wheel, and a precisely similar mistake has been made in describing one of the sculptured slabs from Nineveh, but Sir H. Rawlinson and Dr. Layard assure him, that in their Babylonian researches they have not discovered any indication of the use of machinery for propelling vessels.*

Pancirollus, who wrote in 1587, says he saw an old bas-relief representing an Illyrian galley propelled by three wheels on each side turned by oxen. The same author, and several others, refer to Vitruvius for a notice of the paddle-wheel, but Mr. Macgregor finds, in five editions of Vitruvius, the drawings represent merely a wheel turned by the water, and used as a log to measure the speed.

Again, Claudius Codex is said to have employed paddle-wheels in the invasion of Sicily in the third century before Christ, and some MSS. in the King of France's library (which I have not been able as yet to inspect) are referred to for this statement, but after diligent inquiry no confirmation of it in any accredited authority can be found. An old work on China contains a sketch of a vessel moved by four paddle-wheels, and used perhaps in the seventh century, but the earliest distinct notice of this means of propulsion appears to be by Robertus Valturius, in A.D. 1472, who gives several woodcuts representing paddle-wheels.

Some months ago, Mr. Macgregor inspected two letters, writen in A.D. 1543, by Blasco de Garay, and now preserved in the national archives at Simancas, in Spain. These give the particulars of experiments, at Malaga and Barcelona, with large vessels propelled by paddle-wheels, turned by 40 men. It has been positively affirmed that Blasco de Garay used a steam-engine for marine propulsion, but, after careful and minute investigations at Simancas, Madrid, and Barcelona, he cannot find one particle of reliable evidence for this assertion.*

* An old Chinese woodcut, in the late Dr. Morrison's library (at University College Library), has some resemblance to a paddle-wheel, but this also is probably misinterpreted.

* See *Mechanics' Magazine* for Feb. 13, p. 149, No. 1801.

After the various notices referred to, we find boats propelled by paddle-wheels mentioned by many early writers, such as Julius Scaliger, in 1558, Bourne in 1578, Ramelli, in 1588, and Roger Bacon, 1597.

The muscular power of men, of horses, and of other animals, was often used and frequently patented for propelling paddle-wheels, even to the year 1848, by Miller; and 1856, by Moses. The Marquis of Worcester, in 1661, patented the application of a current to turn paddlewheels on a vessel which they propelled by winding up a rope.* Papin, in 1690, proposed to work the wheels by gunpowder, exploded under pistons; Conrad (1709) used the force of the wind, Maillard (1733) and Goutaret (1853) applied clockwork, Harriott (1797) used falling water; weights were employed by Tremeere (1801); Congreve (1827) used the capillary attraction of a wheel of sponge or glass plates; Dundonald (1833) applied the oscillations of mercury, and Jacobi (1838) employed an electro-magnet to work the paddle-wheels of a vessel on the Neva. The whole number of English patents relating to marine propulsion is 802, from the earliest, granted to Ramsey in 1618, to those of June, 1857.†

It appears that Denis Papin, in 1690, first proposed to use steam to work paddle-wheels. A rackwork was moved by pistons descending in steam cylinders by atmospheric pressure. Savery, in 1702, scarcely ventured with timidity to suggest the use of his steam-engine for the purpose, but it is asserted in a French work that Papin, in 1707, actually propelled a vessel on the Fulda by Savery's engine.

The first patent relating to a steam-boat is that of Jonathan Hulls, in 1736. He placed a paddle-wheel on beams projecting over the stern, and it was turned by an atmospheric steam-engine, acting in conjunction with a counterpoise weight, upon a system of ropes and grooved wheels.

The Comte d'Auxiron and M. Perrier are stated to have used a paddle-wheel steam-boat in 1774, but the notices of these and of other early experiments are very vague, not contemporaneous, or on doubtful authority. Desblancs, in 1782, sent a model to the Conservatoire (still there) of a vessel in which an endless chain of floats is turned by a horizontal steam-engine.

The first notice the author can find of a successful trial of the steam-boat, recorded by witnesses, is in a notarial certificate, which he lately inspected in Paris. This asserts that in July, 1783, the Comte de Jouffroy caused a vessel of 130 feet in length to be propelled for a quarter of an hour by a steam-engine upon the Saône, near Lyons.*

Experiments conducted about the same time, at Dalswinton, in Scotland, by Patrick Miller, resulted, in 1787, in the successful use of a steam-engine, by Miller, Taylor, and Symington, to propel a vessel by paddle-wheels, which worked one before the other in the centre of the boat.

The engine of this, the first practical steam-vessel, is still preserved by Mr. Bannet Woodcroft, Superintendent of Specifications at the Great Seal Patent-office, and it may now be seen at the Patent Museum in Kensington.†

The *Charlotte Dundas* was built on the Clyde canal in 1801. Although Fulton used a steamer on the Seine in 1803, and another in America, *The Clermont*, in 1807, was the first that plied so as to be remunerative in that country. In 1809, the *Fulton the First*, steam-frigate, was launched at New York. Bell built the *Comet* in 1811, at Glasgow, and used it regularly for traffic next year. In 1815, Dr. Dodd steamed from Glasgow by Dublin to London in the *Thames*, which made a stormy passage of 758 nautical miles in 121 hours.

Steam navigation was introduced into France in 1815. In 1818, Napier's steam-packets ran regularly between Greenock and Belfast. It is said that, in 1819, the *Savannah* steamed from New York to Liverpool, but the assertion is very questionable. The *Comet* first carried the Admiralty pennant in 1822. In 1825, the *Enterprise* steamed from England to Calcutta in 113 days. Guns were first carried by the steamer *Salamander* in 1832.

It is to be regretted that, in many cases, from 300*l.* to 500*l.*, besides often ingenuity, time, energy, and private expenditure, were needlessly thrown away by persons re-patenting old inventions, and it is to be hoped that, by the enlightened policy of the present authorities of the Patent Office,

---

* Chabert (1710), Drouet (1722), Pitot (1729), and Boulogne (1729), used a similar plan.

† The information contained in this paper was collected by the writer in compiling, for the Great Seal Patent-office, the "Abridgments of the Specifications" of these patents. Parts I. and II. of this work have been published by the Commissioners of Patents, and the remaining Part will shortly appear. As the authority for every statement is distinctly given in these publications, it will not be necessary to give references here.

* No description of the machinery of this vessel is given before that published, in 1816, by the Marquis de Jouffroy, who gives a sketch of the steam-boat. A copy of this is in the Great Seal Patent-office Library.

† For a history of this engine see *Mechanics' Magazine*, Vol. 66, No. 1764, p. 509.

inventive energy will be delivered from a useless repetition of past efforts, and genius will be set free to cultivate new fields of labour.

The paddle floats of the *Leviathan* do not feather.

Among the few patents relating to paddle-boxes, we may notice Cochrane's (1818), for forcing smoke from the furnace into a closed paddle-box partly submerged, so as to exclude the water. Palmer (1839) did this by pumping in air, while Taylor (1848) allowed it to be forced in by the waves. Symington (1835) led the spray from the paddle-box to cool the engine; and the well-known paddle-box boats were patented by Smith in 1838.

We must go back again to early times for the first appearance of the screw-propeller. It is probable that, as the action of a watermill suggested the use of the paddle-wheel, so the motion of a windmill may have prompted the use of the oblique vaned propeller.*

In 1729, Duquet submerged an apparatus like a smoke-jack or windmill, and the action of the steam turned its shaft so as to wind up a rope.

In 1746, Bouguer states that "revolving vanes, like those of a windmill," had been tried for the propulsion of vessels, but it is not clear that the axis was turned by force inside the vessel, or that the method was an advance on that of Duquet.

The use of the screw-propeller in China may be of an indefinite antiquity. A model of one was brought from that country about the year 1780. It had two sets of blades, turning in opposite directions; but the first distinct description of the screw-propeller to be turned by machinery inside a vessel seems to have been by D. Bernouilli, of Groningen, in 1752, and it is remarkable that this, though the earliest recorded proposal, was well enough matured to comprise the use of oblique vanes at the bow, sides, and stern, turned by a steam-engine, and capable of being hoisted out of the water.

In 1768, Paucton proposed the pterophore, a screw thread on a cylinder, to be wholly or partially immersed. In 1770, James Watt suggested to Dr. Small the trial of a steam screw-propeller; Bramah, in 1785, first patented a rotary engine for this purpose; Ramsey (1792) put the screw between two hulls, and Lyttleton (1794) used a three-threaded screw, while Fulton (1798) tried one with four blades. Shorter's screw (1800), with a jointed shaft,† and worked by men, was applied in 1802, to H.M. ships *Dragon* and *Superb*. The first screw steamer was tried by Stevens in America* in 1804. In 1825 Brown used one on the Thames.

The only patent for combining the screw-propeller and paddle-wheel is that of Turck, 1852. The *Bee*, a naval steam-tender at Portsmouth, has carried both paddles and screw since 1842, but they are not worked together.

Screw-propellers are so various in form that we can scarcely arrange them for consideration according to their shapes or modes of action.

There is scarcely any position under or above water all round the vessel which has not been proposed for the screw-propeller; indeed most of these varieties of position were exhausted by the earliest plans.

The first English patent relating to the subject is Miller's, in 1775. Here the blades are at the end of the arms of a windmill on a vessel's deck, with its axis parallel to the keel. Duncan (1851) put the blades on an endless strap, running outside over the deck and round the hull. He suggested also (1856) that a spiral rib, wound round a floating cylinder, should act for propulsion as the cylinder is caused to turn.†

Bernouilli and Shorter having suggested propellers at the bow, sides, and stern of a vessel, Cummerow, in 1828, placed one in an opening in the stern deadwood, which is now the usual position.

Taylor, again (1838 and 1846), using two propellers on separate shafts, brought them so near that the blades overlapped and passed between each other. Napier (1841) placed one of the approximated propellers astern of the other. Carpenter (1851) put two propellers in separate stern-pieces. Bucholz (1851) had three of them, and placed the middle one astern of the others. In all these cases the shafts were on the same level, but Tombs (1856) placed the shaft of one (the aftermost overlapping propeller) a short distance above the other shaft, to which it was geared,‡ so as to turn in an opposite direction.

In the modes of propulsion adopted by aquatic animals may be found almost every plan which has been used by man with

* The windmill is of an unknown antiquity. There is an interesting description of it by R. Hooke, in 1681. It will be observed that under the term "screw-propeller" we include every rotating propeller with oblique vanes which urges the vessel in a direction parallel to the propeller shaft.

† Patented again by Phipps, 1850, with a moveable outside bearing, and by many others.

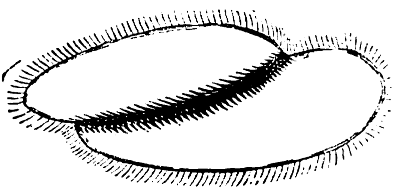
* Worked first by a rotary engine, afterwards by Watt's reciprocating engine.

† A similar mode of propulsion used by an insect is noticed near the end of this paper.

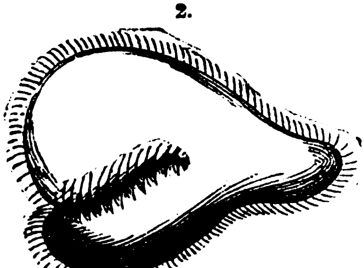
‡ Morrison (1854) placed one propeller "above the other."

machinery. Thus water is ejected for propulsion by the cuttle fish and "paper nautilus;" sails are used by the velella and water birds; punting and towing by whelks and the lepidosiren; a folding paddle by the lobster, feathering paddles by ducks, and oblique surfaces by fish of all kinds. A screw-like appendage is found in the wings of an Australian fly, but it is supposed to be shaped thus only when dried after death. There is, however, one remarkable animal which propels itself by a rotary movement, acting on the water by means very similar to those of the paddle-wheel and screw-propeller combined. This is the infusorial insect Paramecium. Mr. Macgregor's attention was called to this miniature Leviathan by Mr. Robert Mallet, and after some months of ineffectual search he was fortunate enough to see its operations distinctly in one of Mr. Tomkins' splendid microscopes. The form is represented in the accompanying woodcut. A sulcus or

1.



2.



1. Paramecium Caudatum. (Ehrenberg, Taf. 39; and pp. 351, 353.)
2. Paramecium Compressum.

furrowed grove runs obliquely round the oval-shaped body of the animal (in one variety it is only near the stern). A wave-like protuberance passing along this sulcus (with or without cilia) causes the body to rotate on its longer axis, and thus propels it as by the fore-and-aft stroke of a paddle, as well as by the screw-like progress induced by the spiral groove.

"Let us hope," said Mr. Macgregor, in conclusion, "that the giant vessel (the 'Great Eastern') now afloat will be a great success, bearing forth our sturdy emigrants to lands of plenty—honest English hearts to shores of commerce—strong hands to works of industry—strong minds to stores of knowledge—brave armies to fields of glory—and the Gospel of peace to the ends of the earth."

Shells and Shell-guns. By J. A. Dahlgren, Commander in charge of Experimental Ordnance Department, Navy Yard, Washington. Philadelphia: King and Baird. London: Trübner and Co., 60, Paternoster-row. 1857.

The admirably clear statement of the position and prospects of the British Navy by Sir John Pakington, when moving the Navy Estimates for this year in the House of Commons, and the remarks then made by Lord Clarence Paget and Sir Charles Napier, have directed public attention to the subject of the size and armament of ships. We strongly recommend all who wish for data on which to found an opinion on the latter point to consult Capt. Dahlgren's work on shells and shell-guns. The reader will there find the arguments in favour of solid shot and of shells each clearly and fairly stated, and the results of direct experiments as to range, accuracy, penetration, and destructive effect recorded in the form of tables for facility of reference. A comparison of the long 32-pounders, of 57 cwt., which are acknowledged to be the best form of solid shot gun, and the 8-inch shell-gun of 63 cwt., gives the following results. The ranges (the height above the water being nine feet) are as follows:—

8-in. shell-gun—

2 deg. elevation.	3 deg.	4 deg.	5 deg.
970 yds....	...1,260 yds......	1,540 yds......	1,770 yds.

32-pounder—

1,170 yds........	1,510 yds......	1,750 yds......	1,940 yds.

So that, to obtain the same distances as the 32-pounders, it will be necessary to give a greater elevation to the 8-inch of 63 cwt. This would seem to point to the conclusion that, for like ranges, the 32-pounder is the more accurate piece. Such, however, was not found to be the case in a comparative trial recorded by Capt. Dahlgren. Of the ten *shot* fired from the U.S.N. 32-pdr. of 57 cwt., with a charge of 9 lbs., at an elevation of 2 deg. 33 min., in calm weather, only *three* struck the screen, one of which was on ricochet, having fallen 22 yards short. The other seven either passed over, or to the right or left—or they fell short and deviated to the right and left; whereas, of the ten *shells* fired from the U.S.N. 8-in. of 63 cwt.,

with same charge, at an elevation of 3 deg. 12 min., in the same weather, *five* struck direct, one on ricochet, one deviated to the right, two to the left, and one passed over the screen. At 1,300 yards the 8-in. shell-gun proved to be more accurate than the 32-pounder in the ratio of 5 to 2, or, including the ricochet, 6 to 3.

The result of this carefully-conducted experiment certainly differs from what we should have expected, but is not the less conclusive, for the number of shots fired from each piece (10) was too great to admit of chance interfering much, though too small to establish the exact ratio of the superior accuracy of the shell-gun.

The penetration, with the U.S. service charge of powder (9 lbs.), is as follows, using a formula which has been arrived at by French and Belgian artillerists, and which has been proved to be very nearly accurate:

32-pound shot—				
Distance in yards	500	1,000	1,500	2,000
	38½ in.	26¼ in.	18¼ in.	12¼ in.
8-inch shell—	33½ in.	23 in.	16 in.	11 in.

The shot must pass through the side of a vessel to do serious damage, whereas the shell really has greater destructive power when it does not quite perforate it, but bursts after penetrating within a few inches of the inside, so that its slightly less power of penetration is not a sign of inferiority. It must be borne in mind, also, that the size of the holes made differs considerably, that made by the shell being nearly double the other.

A 32-pounder can be fired about 15 times, while an 8-inch shell-gun is fired 14 times; but 14 shells of 51 lbs. weigh 1,428 lbs., whereas 15 shot of 32½ lbs. only weigh 975 lbs., which shows that a greater weight of metal can be thrown in a given time by the shell-gun.

Carefully weighing all these results, Capt. Dahlgren, we know, has come to the conclusion that the shell is for all purely naval purposes the best weapon. Hollow shot, or unloaded shells, he most justly condems, as loaded shells evidently combine all their advantage with the destructive power peculiar to themselves.

Capt. Dahlgren records the results of some very interesting experiments as to the penetration of shot and shell into a target of massive oak. The 32-pound shot, at 1,300 yards, is found to penetrate about 21 inches into a mass of timber 30 inches thick; the 8-inch shell to penetrate about 16 inches; whereas the 9-inch shell from the new U.S.N. shell-gun sometimes passes quite through the 30 inches, its power then being completely spent. As the sides of a ship of the line are of an average thickness of 30 inches, Capt. Dahlgren, therefore, considers the 9-inch shell the *minimum* which should be fired against them; and, assuming the experiments to have been sufficiently extensive to establish his premises, we cannot see how his conclusion can be evaded.

We must refer our readers to the pages of the author for much general information on fuzes; on the effect of the eccentricity of shot; on the relative advantages of a thick shell and small contained charge of powder, and a thinner shell with a larger charge; on the proper weight of gun to throw a given projectile (Capt. Dahlgren condemns the 10-inch shell-gun of 87 cwt., as very much too light); and on various other points.

Not the least interesting portion of his book is that devoted to the consideration of some incidents of the late war.—Are we wrong in thinking the author a *little* partial to the Russians in his account of the affairs? Nearly all pointing to the conclusion that, at ranges over 800 or 900 yards, none of the present means of offensive warfare can produce decisive results, unless the disparity of force be enormous.

Since Capt. Dahlgren published his work we have not been idle, and have now afloat some fast vessels, very heavily armed; but his comparison between the *Merrimac* and *Shannon* still retains its interest. These frigates carry—

	Gun-deck. Guns.	Spar-deck. Guns.
Merrimac—	24 IX-in.	14 VIII-in of 63 cwt., 2 X-in. of 107 cwt.
Shannon—	30 VIII-in., 65 cwt.	20 32-pds., 56 cwt., 1 68-pdr., 95 cwt.

The 772 lbs. of 8-inch shells from the gun-deck of the *Shannon* are inferior, not only in mere weight, to the 864 lbs. of IX-in from the gun-deck of the *Merrimac*, but also in accuracy and power, so that a distant object will be struck by less of that weight and with less force. "The accuracy of the 8-in. to IX-inch being," says Capt. Dahlgren, "about as 5 to 7, the penetration as 9 to 10, and the content of powder as 5 to 6, with the further advantage to the IX-inch of greater effect by reason of the superior content of the individual shells—larger orifice and greater shock of impact. Then, on the spar-deck," continues he, "we have for the *Merrimac* 360 lbs of 8-inch shells to oppose the 325 lbs. of shot from the *Shannon*: the accuracy of the 8-inch shells to the 32-pounder shot being as 5 to 3—the shock

and orifice greater, with the addition of the explosive force of 14 lbs. of powder. The *Merrimac* has 2 pivot X-inch to meet the one 68-pdr.: that is, 200 lbs. in heavy shells to meet the one 68-pdr. shot, or one 8-inch shell."

This comparison of the two ships is worthy the attention of the authorities, although the statement of the inferiority of the English ship, by the American officer, is certainly not more striking than that which we published some months since, respecting the inferiority of the *Niagara* to our own frigates of the *Diadem* class. (See Vol. 66, p. 506.)

MR. J. SCOTT RUSSELL ON MECHANICAL INVENTION.

Mr. J. Scott Russell, who is well known to possess great ability as a public speaker—much greater than generally falls to the lot of scientific men—addressed to the Society of Arts last week a speech on mechanical invention, in which much genuine truth and humour were combined. The occasion of his remarks was the delivery of Mr. Macgregor's paper on the Paddle-wheel and Screw-propeller, at a Meeting over which he (Mr. Russell) presided. At the conclusion of the paper he rose and said:—

"He was sure they had listened with pleasure and profit to the admirable paper of Mr. Macgregor, which could not fail to be useful in assisting inventors to avoid wasting their energies in inventing over again that which they would probably find had been invented before. He feared it was not generally believed that the faculty of mechanical invention was not a very unusual faculty—that it belonged to nearly everybody, and that it was one of the greatest misfortunes that could fall upon a man when he took it into his head that he was endowed with a larger portion of that faculty than anybody else. He could assure them that that was the thing which practical engineers were most afraid of in themselves. They had to be constantly guarding themselves against the temptation to invent, for it was a much safer course to be contented with exercising their judgment on the inventions of others. Invention, then, in mechanics, he did not think at all a distinguishing faculty; and he believed there were men in this country who could invent anything they were asked for, and all we had to do was to pay them for inventing. Therefore, he advised most people not to invent, but to pay other people, who had nothing else to do, to invent for them; they would find it much cheaper. Of the hundreds of inventions that had passed through Mr. Macgregor's hands in the extensive research he had undertaken in preparing this paper, were they not amazed to see how few were at this day in practice; and were they not struck with the fact that nearly all the inventions they now heard of no more seemed monstrously ingenious, whilst the inventions actually in use were those which appeared to have got rid of all the ingenuity, and to have merely retained one or two plain, simple, common sense elements in them! Now, that was the lesson which he would wish Mr. Macgregor's paper to have taught to that audience, especially the younger members, and that was the lesson he hoped it would teach to the mechanical world at large in the wider sphere of its influence when published in the *Journal* of the Society. There was another very good rule which might be laid down, and that was, that no man should set about inventing anything but what had reference to his own trade. He remembered a person coming to him and saying, 'I wish you would find a situation for my brother on a railway or steamboat, or anything else that you are connected with.' He asked him what his brother was, and he replied that he was a portrait painter, while he himself was a house painter; and he (Mr. Russell) then asked him why he thought his brother would be more useful in one of the occupations he had mentioned rather than in assisting him in house painting, which he (Mr. Russell) thought was much more closely allied to portrait painting. He, therefore, humbly suggested this to him, as being better and more appropriate than an employment either on a railway or a steam-boat; to which his Scotch applicant replied, that his brother might do very well for a railway, or a steam-boat, or anything else, but he would never make a house painter. He continually had gentlemen coming to him and inventing for him something to assist him in his business, of which they began by telling him they knew absolutely nothing, and when, in return, he ventured to suggest the propriety of devoting a little of their spare time, which they devoted to his trade, to the making of better shoes or coats, which might be their own business, he was sorry to say he was treated with the greatest disdain for presuming to give advice in a matter of which, of course, he knew nothing whatever."

Of course there is room for much to be said on the opposite side of this question. If every one were to accept Mr. Russell's advice mechanical invention would come to an end. If James Watt, and a host of

others, had acted as he suggests, where would have been our steam trains, steam fleets, steam machines of innumerable kinds, and a thousand other marvels of invention? Still, there can be no doubt about the wholesomeness of Mr. Russell's counsel, and its applicability to many and many an inventor, and therefore we commend it to the judgments of our readers, although we confess there is but little hope that many of them will avail themselves of it, for, as the Earl of Caithness (who has had great experience in this matter) afterwards said, "It was easy for the Chairman to recommend people not to invent, but the difficulty was for any one to keep himself from inventing. They might almost as well tell people not to think as tell them not to invent." At the same time Lord Caithness considered that Mr. Scott Russell had given very excellent advice, and he himself recommended persons, before they began to invent, to ascertain whether the same thing had not been invented before. "He could speak," he said, "from his own knowledge and experience, that when he thought he had conceived some grand idea, he often found it had been given birth to many years before."

HYDRAULIC MORTAR.

At the Institution of Civil Engineers, April 13, 1858, Isambard K. Brunel, Esq., Vice-President, in the chair, a paper was read on the Theory and Practice of Hydraulic Mortars, as made on the New Works of the London Dock Company, 1856-57, by Mr. G. Robertson, Assoc. Inst. C.E.

It was observed that many of the contradictory statements of writers on this subject arose from a misconception of the word "hydraulic," which ought not to be applied to limes, merely because they set under water (as many soluble substances would do the same), but should be reserved for those which increased in hardness from the action of the water itself.

The chemical effect of calcination on blue lias was examined. According to calculation, 38·35 per cent. of water and carbonic acid should be driven off in the kiln; but, on burning 145 tons of stone, and weighing the lime produced, it was found that as much as 40·63 per cent. had been driven off, a difference, however, of only 2·28 per cent., due to a larger quantity of moisture in the mass than in the small specimen. It was next shown that when lias lime was slaked so as to form the best and strongest mortar, it increased 31 per cent. in weight, or 8 per cent. more than the water required to form a hydrate with the oxide of calcium found by analysis in the stone.

As lime was soluble in water, it must be protected, either naturally or artificially, before it could be used in hydraulic works. The nature of this protection had been the subject of many theories, and was examined by the author. The true time, both theoretically and practically, for mixing hydraulic lime as mortar, was shown to be at the point when hydration was perfectly over, and before the formation of silicates; "blowing" being avoided on the one hand, and friability on the other.

The different methods of slaking lias lime were then examined, and that of spontaneous extinction shown to be almost impracticable on large works, even were it desirable, which it was not. When slaked with the quantity of water practically found to make the strongest mortar, no difference was found to exist, on the large scale, between slaking in the ordinary way and by immersion. After trying about 400 tons, the latter system—proving about 50 per cent. dearer, was abandoned.

The next point treated of was the first hardening, or "set," which took place when mortar was permitted to stand undisturbed. This was proved to be due, not to desiccation, but to a mechanical absorption of the water of mixture, by the capillary attraction of the pores of the lime, hastened or permitted, as the case might be, by evaporation or by chemical agency. Four modifications of setting were named.

After alluding to the use of pozzuolana, the paper proceeded to treat of the ultimate hardness caused by the absorption, from air or water, of carbonic acid, and gave the distances it was found from practice to have penetrated into various limes and cements, with its rate of travel. It was ascertained that the penetration varied inversely with the strength of the silicate in the mortar, and also that limestones gave off carbonic acid to mortar in contact with them.

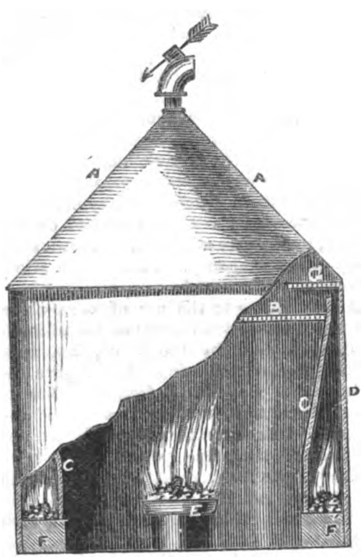
Allusion was then made to various substances which had at different times been deemed hydraulic. Alumina was valuable only as a cheap and convenient carrier of silica, to present it in a useful form to the dydrate of lime, and to assist in the formation of double silicates. Considerable attention had been paid to the dydraulic pretensions of iron, whether as a metal or an oxide; it was considered of doubtful advantage in any form, and in some it was positively injurious.

In the second portion of the paper a minute account was given of the manufacture of the mortar for the London Dock Extension.

PLOMLEY'S PATENT METHOD OF DRYING MALT, HOPS, ETC.

Mr. J. Croft Plomley, of Maidstone, has patented a very useful method of drying malt, hops, and other produce, by means of heat introduced or made to act at the surface, in addition to the ordinary method of drying by causing currents of heated air to penetrate through the materials. In addition to the drying, this method of introducing heated air to act on the surface of the goods carries off the damp and moisture arising from the ordinary method of drying, and enables the patentee to dry goods in a shorter time, and to ensure a better quality in such goods as hops than when they are only dried by the means now generally practised.

In the engravings annexed we have

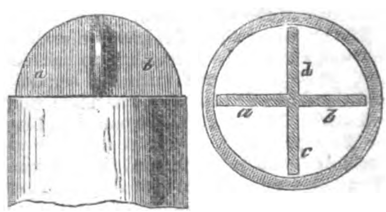


illustrated the manner in which the invention is carried into effect when constructing a new oast-house, although it is evident that the improved method of drying may readily be carried out in ordinary oast-houses by applying thereto suitable fires, deflectors, and partitions in the manner about to be described. A, is the roof, which he prefers to form of about the slope indicated; B, is the perforated drying floor; C, is a partition which he introduces, and between which and the external wall, D, he places—in addition to the central fire, E—the side fires, F, F′, of which there may be two, three, four, or more. G, G′, are deflecting plates placed above the fires, F, F′, which plates may be hinged and furnished with rods or other appliances, by means of which they may be raised or lowered, more or less, as may be required. The action of the whole is as follows:—The heated gases from the central fire, E, rise directly through the perforated floor, B, as in ordinary oast-houses; and the heated gases from the side fires, F, F′, rising up between the wall, D, and the partition, C, are directed down upon the substance to be dried by means of the deflecting plates, G, G′, thereby aiding the drying thereof, and also helping to drive off the damp and moisture arising from the action of the central fire, E.

MUIR'S PATENT FOUR-POINTS VENTILATORS.

Since the article on Watson's Ventilators was published in the *Mechanics' Magazine* for April 10th, our attention has been drawn to a somewhat similar, but, in our opinion, a superior apparatus, patented a year or two since by Mr. G. W. Muir, of Pall-mall, Manchester. It will be recollected that the characteristic feature of Watson's arrangement is the establishment of an upward and downward current in a single pipe, by means of an internal diaphragm—a contrivance which every student of natural philosophy must be familiar with. For common ventilating purposes these currents are established by the air coming in contact with the diaphragm, being thus directed down the pipe, at the same time forcing the internal air up the pipe on the opposite side of the diaphragm. The two currents—ascending and descending—are thus established. Now, if our readers will glance at the annexed engravings, which represent an elevation

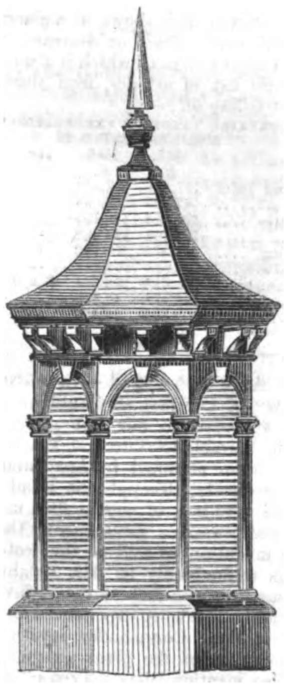
Fig. 1. Fig. 2.



(Fig. 1) and a horizontal section (Fig. 2) of a tube containing a double diaphragm, they will see that in whatever direction the external air may be moving it must come against one or other at least of the divisions, *a*, *b*, *c*, *d*, and be carried down by it, thus setting up the required currents in

the tube; whereas, were the diaphragm single, there are directions in which the air might move—viz., directions nearly or quite in a line with the diaphragm—without being deflected to any noticeable effect by the diaphragm. This illustrates the main difference between the ventilators of Mr. Watson and Mr. Muir; the former employs the single, the latter the double, division of the tube. Mr. Muir has, we find, applied his "Four-points Ventilators," as he calls them, very extensively, and with excellent results. He gives them various ornamental forms externally: that shown in Fig. 3

Fig. 3.



may be taken as a simple but neat example. Mr. Muir also employs a contrivance for preventing direct down drafts in buildings to which his apparatus is applied. This consists of a horizontal plate (which may be of any ornamental form) placed below the ventilating tube for the purpose of deflecting the vertical down current into horizontal directions, and thus cause it to diffuse itself rapidly, and over a large space, before it reaches the lower levels of the apartment. We strongly recommend these improvements of Mr. Muir's.

THE IRON TRADE.

FROM OUR OWN CORRESPONDENT AT WOLVERHAMPTON.

Quarterly Meetings—A Slight Improvement in Trade—United States Market—Variation in Prices—The Unemployed—Strikes Discountenanced — Board of Trade Returns—Decreased Exports of Iron and Machinery.

Since our last report the quarterly Meetings of the Ironmasters' Association have been held. The condition of the trade had improved in the interim of a week, which elapsed between the preliminary Meeting and the first of the quarterly Meetings. The improvement, however, was scarcely more than that, men thinking the tide of adversity had begun to ebb, a little more confidence had sprung up. Since the quarterly Meetings a few more orders have come to hand in small quantities from the home and continental markets. So that, in reality, and not in imagination only, the trade has improved a shade in the past fortnight; but no very marked alteration in favour of makers is looked for before the expiration of the quarter.

The reports from the United States are not so favourable as they were at the commencement of the month. The reputation of Transatlantic customers for meeting their engagements is not so good now as then; and certainly the demand thence has subsided to a conspicuous extent.

The prices recommended at the preliminary Meeting were confirmed at the quarterly gatherings. They are, for bars, 8*l.*; hoops, 9*l.*; and sheets and plates, 9*l.* 10*s.* and 10*l.* Whilst, in many of the subsequent transactions, these rates have been maintained, they have not been adhered to universally, even by the first-class houses, some of whom we know have offered to accept orders for sheets and plates at 10*s.* below the above quotations. In regard to houses of less note, offers are being accepted by some, that others, who are determined to make only at a profit, are unable to accept.

The large number of nearly unemployed workmen are bearing their privations man-

fully. The masters are doing their best to lessen their difficulties as much as possible by employing a portion of their aggregate number at a time, and by putting the day-men upon half work.

In the cases of the workpeople who continue employed, and in regard to whom a reduction of wages has had to be imposed, a prudent course is being taken by the men, both puddlers and colliers. Instead of, as often heretofore, "striking," upon receiving a notice of reduction, they have met and appointed deputations to wait upon the leading masters, when such explanations have been afforded to them, such promises made to give them the benefit of an improved demand, and to remove local grievances, as have worked to the mutual advantage of employers and men, and done more to bridge over the distance that has hitherto separated these two interests than any occurrence that has transpired for some time past.

Whilst this can be remarked of South Staffordshire, it cannot, unfortunately, be said of one or more districts elsewhere. A different course was pursued for some time by the colliers in Wales, and is now being practised in South Yorkshire.

The Board of Trade returns for February show that the iron and hardware trades have largely participated in the general falling off in the value of the exportations, as compared with those of the corresponding month last year.

The exports of hardwares and cutlery declined from 283,711*l.* to 188,699*l.*, though there was an increase in the shipments to France and India. Machinery, which till last month had continued to be exported in increasing quantities, at last shared in the general stagnation: the total value was only 215,958*l.* against 245,868*l.* There was an increased exportation of steam-engines to Holland, and of other descriptions of machinery to France and Australia, but not to an extent sufficient to neutralize the diminished shipments to Spain and India. The metallic exports of the month are shown in the following table:—

	Month of February, 1856.	1857.	1858.
	£	£	£
Iron, pig	95,201	86,309	47,337
,, bar and rod	383,741	443,072	260,687
,, wire	13,098	23,589	9,693
,, cast	35,165	62,438	58,773
,, wrought	250,273	268,511	157,527
Steel	49,986	58,008	28,564
Copper, unwrought	65,843	58,700	62,103
,, sheets and nails	133,320	133,643	122,710
,, wrought	9,880	26,735	66,459
Brass	7,795	11,607	7,483
Lead	34,450	32,982	28,169
Tin, unwrought	7,827	19,305	16,926
,, plates	78,121	135,587	80,502

The decrease in pig-iron was general; there were no shipments to Prussia, and those to Holland, France, and the United States fell off very considerably. Bar and rod iron fell off to a proportionate extent, and with the same uniformity as regards the sources of the foreign demand. Cast-iron is almost the only article of which the exportation to the United States did not decline, and there was also an increase to India and Brazil; hence the diminution of the value of the exports was not so great under this head as in other branches of the iron trade. The decline in the tin-plate trade was general, extending even to Australia.

The annexed table shows, at a glance, the extent of the increase or decrease, under the several headings to which it relates. In the entire list of articles, iron shows the greatest falling off:—

DECREASED VALUE OF EXPORTATIONS.

Month ending Feb. 28,	1857.	1858.	Inc.	Dec.
	£.	£.	£	£
Coals and culm	191,541	203,972	12,431	—
Glass	41,328	39,698	—	1,630
Hardwares	283,711	188,699	—	95,012
Leather	164,292	122,462	—	41,830
Machinery	245,868	206,958	—	38,910
Iron and steel	941,927	562,581	—	379,346
Copper and brass	230,685	258,755	28,070	—
Lead	45,472	40,489	—	4,980
Tin	154,890	97,428	—	57,462

THE ATLANTIC CABLE.—In reference to the letter of Commander Shuldham, R.N., which appeared in our last number, we think it desirable to state that Mr. Bright's patents were obtained in April and May last respectively, although the Final Specifications were not, of course, filed until six months afterwards. Consequently the priority of invention, as well as the protection, belongs undoubtedly to Mr. Bright. At the same time the fact of the re-invention of the apparatus by so experienced an officer as the gallant Commander speaks much for the merit of the plans adopted. We may also mention that "Tyro's" suggestion in our last number differs in no way from what was actually done last year with the Atlantic cable. The experiment of making the junction in the manner described was tried in deep water, and answered the purpose effectually.

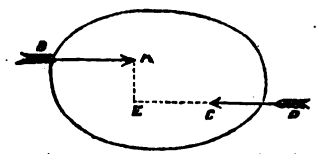
KITCHEN RANGES.—Gentlemen,—My old lady is continually grumbling, especially at a week's end, about the top bar of our kitchen range losing its colour; in a few hours after it has been scoured as bright as possible, it turns to a dull purple and blue. Perhaps some of your numerous readers will supply a remedy.—W. R. M.—Oldham, April 17, 1858.

STABILITY OF FLOATING BODIES.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—The following is an attempt to prove the same theorem of which I gave you a less general demonstration last week:—

Suppose a body to be acted on by two equal and opposite forces each $= P$. Sup-



pose the points of application of these forces to be dependant for their positions on the angular position of the body. Suppose, farther, the said body to be set revolving from any position by the action of these forces. Let $\theta =$ the angle moved through in time t, and $u =$ the work accumulated in the body in the same time and during the same motion; also let $y =$ the arm of the couple, or the perpendicular distance between the two lines of action, and a the distance between the points of application measured in the direction of the forces.

Thus, in the figure, A E $= y$, C E $= x$. D C and B A are the two forces both equal to P. Then u, x, y, may all be regarded as functions of θ, and the following equations will hold:—

$$\frac{du}{d\theta} = -P\frac{dx}{d\theta} \;\ldots\ldots\ldots\ldots\; (I)$$

$$Mk^2\frac{d^2\theta}{dt^2} = Py \;\ldots\ldots\ldots\ldots\; (II)$$

Again—

$$u = \tfrac{1}{2}Mk^2\left(\frac{d\theta}{dt}\right)^2$$

$$\therefore \frac{du}{d\theta} = Mk^2\frac{d^2\theta}{dt^2}$$

$$= Py$$

$$= -P\frac{dx}{d\theta}$$

$$\therefore y = -\frac{dx}{d\theta}$$

Now, it is quite plain that the positions of equilibrium are those in which $y = 0$ or when $\frac{dx}{d\theta} = 0$, that is, when either x is either a maximum or a minimum. Suppose $\theta = a$ to give a position of stable equilibrium; then it is clear from the nature of stable equilibrium that if h be a small angle, when $\theta = a - h$ the forces must tend to increase the motion of the body; and when $\theta = a + h$ the forces must tend to diminish that motion. $\frac{du}{d\theta}$ therefore must be positive when $\theta = a - h$; $\frac{du}{d\theta} = 0$ when $\theta = a$; and $\frac{du}{d\theta}$ negative when $\theta = a + h$. From this we see that $\frac{d^2u}{d\theta^2}$ must be negative when $\theta = a$. But

$$\frac{d^2u}{d\theta^2} = -P\frac{d^2x}{d\theta^2}$$

therefore we have when $\theta = a$,

$$\frac{dx}{d\theta} = 0$$

$$\frac{d^2x}{d\theta^2} = \text{a positive quantity};$$

and thence x is a minimum.

In a similar manner we may show that for a position of unstable equilibrium x is a maximum.

This proof seems to me to have some technical mist about it, and it does not perfectly satisfy me. I think, however, that it is correct, and if so, it has the merit of being more general than that which I have already sent you.

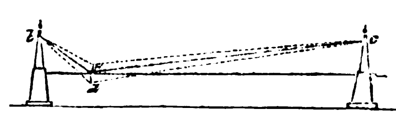
Yours, &c.,

A MECHANIC.

ORDISH'S RAILWAY SUSPENSION BRIDGE.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—On perusing the description in the *Mechanics' Magazine*, No. 1810, of Mr. Ordish's improved railway suspension bridge, and comparing it with the accompanying engraving, I was brought to



a full stop upon arriving at the patentee's statement, that "*the effects of expansion and contraction from variations of temperature have no tendency to alter the relative position of the parts of the structure.*" Now this appears to me to be an untenable assertion, because the chains are of unequal

lengths. Taking the distance, *a*, *b*, in the annexed diagram, as an unit, which is about one-fourth of *a*, *c*, the contraction or expansion of the latter would be four times that of the former; consequently if by the variation of temperature *a*, *b*, is extended or contracted one, *a*, *c*, will be four, which will alter the position of the point of intersection, *a*, and either raise it above or sink it below its original position, at the same time transferring it from left to right; that is, in contraction, *a* would be elevated, and at the same time removed somewhat to the right; the reverse would take place with expansion, and the point *a* would describe a double curve, *a*, *d*. The same result will take place with respect to the elasticity of the metal. The above process of reasoning suggests the necessity of a short connecting link between *a* and the longitudinal girder, to fulfil the conditions of a direct and equal tensile strain on the chains.

I am, Gentlemen,

Yours respectfully,

J. W.

15, Gillingham-street, Pimlico,
April 19th, 1858.

CEMENT, OR ARTIFICIAL STONE RIFLE-SHOT.—Captain Norton has presented to the United Service Institution, and South Kensington Museum, an elongated rifle-shot, made of Johnson's cement, which is as hard as flint, and so adhesive as not to be injured by the explosion of the charge in the gun. It was moulded in a rifle mould, by Messrs. Troughton and Bevan, of Gravesend. From its elongated form, it has the specific gravity of an iron spherical shot.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

SMITH, T. M. *Improvements in the preparation of materials applicable to the manufacture of candles.* Dated July 14, 1857. (No. 1961.)

This consists in acidifying the fat separately, and separating the oil from it by pressure, and then mixing the resin with the acidified fat, and lastly subjecting the mixture to pressure.

GAUNTLETT, W. H. *Improvements in thermometric apparatus.* Dated July 14, 1857. (No. 1962.)

Here the patentee employs a tube of metal, in the interior of which there is a rod of wood or porcelain which expands but slightly, or not at all, with heat. One end of the rod is connected to the tube, and to the other end of the rod is connected a lever or arm which is caused constantly to press against the end of the tube, by means of a spring. To the end of the lever or arm is attached a marker, the point of which is caused constantly to press against a strip of paper carried by a roller or moving surface actuated by clock work. By this arrangement of apparatus when the tube of metal expands or contracts according to the variations of temperature, the lever or arm is caused to move, and the pencil marks on the paper.

MOULIN, F. *A new improved railway brake.* Dated July 15, 1857. (No. 1963.)

This invention cannot be described without engravings.

LOCKE, W. J. *Constructing an improved oil can.* Dated July 15, 1857. (No. 1964.)

This oil-can is so constructed that any waste oil which may run down the outside of the spout or tube after having been used shall return into the oil-can by a separate tube arranged for that purpose.

BERTIN, E. *A new manufacture of fibre, suitable for the purposes to which hemp and flax are usually applied.* Dated July 15, 1857. (No. 1966.)

This relates to the use of the leaves and bark of the plant called "Baguois" in the French and English colonies, to the separation of the bark or cuticle and gumo-resinous parts; and lastly, to the employment of certain machinery for facilitating the preparation of the fibre.

WALKER, G., and J. CLACHAN. *Improvements in looms for weaving.* Dated July 15, 1857. (No. 1968.)

This relates in some respects to an invention patented by M. A. Muir and J. M'Ilwham, 18th June, 1856, and consists of certain mechanical combinations and arrangements whereby Messrs. Muir and M'Ilwham's loom, as well as other looms of a similar class, are rendered more effective as regards their range of variety in weaving. This invention also provides for the addition to such mechanism of a separate twilling heddle action.

JOHNSON, J. H. *Improvements in machinery or apparatus for marking or imprinting characters on paper and other fabrics.* (A communication.) Dated July 15, 1857. (No. 1969.)

This relates to the use of certain apparatus in substitution for the ordinary process of writing. This apparatus is composed of a number of hammers placed in a circle, to strike upon one central point, upon the face of which hammers the letters of the alphabet are cut in relief. These hammers are put in motion by means of keys similar to those of a pianoforte keyboard.

BLANDFORD, H. *An improved combination of apparatus for distributing manure.* Dated July 15, 1857. (No. 1970.)

It is proposed to employ any suitable manure distributor, mounted on lower wheels than usual, to admit of its being placed below and immediately behind the tail of a cart to which it is attached. The manure (any description of a solid form) is brought into the field in a cart, and is shovelled thence into the box of the distributor to supersede the usual practice of first placing the manure in heaps in the field, and then separating it by hand labour.

JOHNSON, J. H. *Improvements in sewing machines.* (A communication.) Dated July 15, 1857. (No. 1971.)

According to one arrangement it is here proposed to produce a single thread, chain, or tambour stitch, by means of a needle and revolving hook, each loop of the stitch being twisted half a revolution after it has been drawn through its predecessor, by which means a firm and secure chain stitch is obtained. Modifications of the foregoing arrangements are included in the invention.

JONES, W. *Improvements in mouldings for casting metals.* Dated July 16, 1857. (No. 1972.)

These consist in cutting out of the sand or loam the required pattern. The patentee employs a cutter of the peculiar form desired, and attaches to it any convenient apparatus for working it.

WRIGHT, J. *Improvements in the manufacture of gas.* Dated July 16, 1857. (No. 1973.)

This applies, 1st, to an improved arrangement for distilling the coal in the retort to prevent the formation of tar and to increase the quantity of the gas obtained. 2d. To the introduction, by means of a tube bent twice upon itself, and one extremity passing into the retort, small quantities of ammoniacal liquor, which has been previously produced. The patentee further proposes to improve the action of the hydraulic main by fixing division plates so as to form compartments to separate the mouth of each dip pipe from the other, and also to attach a lid to each compartment in order that easy access may be had. He proposes also to connect an equilibrium reservoir to the throttle valve of the engine used for working the exhauster, so as to regulate the back pressure on the retorts. The reservoir must be placed so as to receive and pass through it all the gas from the retorts immediately after leaving the condenser, and before passing into the purifiers. He proposes also the following methods of purifying the gas to remove the carbonic acid, sulphur, and sulphur compounds:—To a solution of sulphate of iron he adds a solution of carbonate of potash, using the latter as long as any precipitate is formed. The precipitate is of a grey colour. He then saturates with it a quantity of sawdust. Through this he passes the gas which has been purified by the ordinary methods. This changes the colour of the sawdust red, and the gas loses its carbonic acid. Having prepared a stock of this sawdust after the above-described manner, he places it in the purifiers, and passes the crude gas through it; and he finds this has the effect of removing the sulphur and sulphur compounds from it. The sawdust may be used until it becomes black.

COX, J. *Improvements in apparatuses to enable persons to progress in swimming.* Dated July 16, 1857. (No. 1974.)

This consists of improvements on an invention patented by the patentee, 19th Jan., 1851, for constructing swimming apparatuses to be fitted to, or worn on, or round the legs, feet, arms, or hands, capable of having expanding and contracting motions similar in action to the web feet of aquatic birds. The patentee now hinges the ribs of the apparatus independently of the cloth. He uses for the body gutta-percha, sheet metal, vulcanized india-rubber, or leather. Instead of sewing the cloth to the body, he sticks it firmly to it with a waterproof solution.

DEFIS, G. *Certain improvements in preventing incrustation in boilers.* Dated July 16, 1857. (No. 1976.)

To prevent incrustation in marine boilers, the patentee mixes in the following proportions:—Crystallised salt of soda, 65 lb., potass, 44 lb., plumbagine, 22 lb., black resin, 22 lb., vine-branch ashes, 66 lb., pine-wood, 22 lb., walnut, 66 lb., soot, 11 lb., linseed cakes, 22 lb., tannin, 66 lb., tallow, 22 lb., flour of sulphur about 4½ lb. The substances are reduced to a fine powder, and made into a liquid paste with sea-water. About ¼ lb. of this paste per horse-power is afterwards placed in the apparatus to be introduced into the boiler. This apparatus cannot be described without engravings.

MATHEWS, G. S. *Improvements in railway breaks.* Dated July 16, 1857. (No. 1977.)

Between two adjoining wheels of a carriage the patentee supports a break or skid surface immediately over the rails by two rods, which are again supported from a cross beam. The height of the skid or break may be regulated by nuts and screws on the rods. The cross beam is supported at the middle on a vertical screw, in the framework of the carriage. This screw

passes up through the floor of the carriage and has a lever by which it may be turned, to cause the breaks to press on, or rise from the rails. When more than one pair of skids are so applied, the patentee connects each pair with a cross-beam and central-screw, and to communicate the necessary motion, fits a lever on each pressure screw, and connects the whole of such levers by longitudinal connecting rods, so causing all the breaks so coupled to be thrown into action at the same time.

RUSSELL, J., H. W. SPRATT, and W. PRESS. *A certain new method or methods, or new improvement or improvements, in the construction, application, and use of machinery for propelling boats, ships, or vessels of any class or denomination.* Dated July 17, 1857. (No. 1981.)

This relates to propelling vessels, by causing any number of bodies, floats, &c., to enter the water; then to move through the water in a horizontal direction backwards or forwards; then rise out of the water in nearly a vertical manner, to return again over its surface, ready to descend again for another similar and continuous action.

GRIFFITHS, T. F. *An improvement or improvements in shaping metals.* Dated July 17, 1857. (No. 1983.)

This has for its object the production of annular or ring-like feet to vessels made of sheet metal, and also the production of ring-like projections in sheet metal, and consists in producing them by the use of dies in a manner that cannot be described without engravings.

JOHNSON, J. H. *Improvements in steam-boilers.* (A communication.) Dated July 17, 1857. (No. 1984.)

This relates chiefly to the boilers of locomotives and portable engines. The outer shell is cylindrical, and contains a central cylindrical flue, covered at its inner end by a concave cap, rivetted to a flange. This flue is surrounded by sets of tubes, which open through the flange into the concave cap. By this arrangement the tubes are in communication with the cylindrical flue, whilst their front ends open into the smoke-box, which is at the furnace end of the boiler. The furnace is placed inside the cylindrical flue. The tubes thus act as return flues, and greatly increase the heating surface. Water surrounds the sides of the flue and tubes, and a water space is left between the concave cap and the end of the boiler.

CLUNES, T., and J. MACINTOSH. *Improvements in machinery or apparatus for bottling or supplying vessels with fluids.* Dated July 17, 1857. (No. 1985.)

The apparatus employed consists of a reservoir into which the liquid to be bottled is supplied, and which is at the back and upper portion of the apparatus, and is lined to the level of the liquid, this level being preserved by a stop-cock, or a ball float. This reservoir is fitted with a vertical permeable diaphragm for keeping back floating impurities, and at the front side there are fitted into it a series of bottling syphons or fixed bent tubes, which have their longer arms curved down into the bottom of the reservoir, their bottom open ends being just clear of the reservoir bottom. The outer end of each is screwed to receive the screwed upper end of a pendant valvular supplying tube, which carries down this leg of the syphon tube to a lower level than that of the reservoir bottom. The bottom of this tube is closed up with a valve seating, above which are lateral openings for the outflow of the liquid. This tube is embraced by a long outer tube, the bottom of which rests upon the valve seating of the internal tube, whilst its upper open end carries a small weight to keep it down. Beneath the supplying syphons there is an inclined platform, with a series of ledges for the bottoms of the bottles, which are each placed beneath a projecting syphon leg, and entered up so as to bring the leg low down in the bottle, and being still further pressed up, the top of the bottle neck catches against the lower side of the weight and lifts up the tube, causing the lower end or valve-face part to clear the valve seat, and permit the liquid to flow down into the bottle. When the level in the bottle reaches the level in the reservoir, the supply ceases.

UPWARD, A. *An improvement in the manufacture of coke.* Dated July 17, 1857. (No. 1986.)

This consists in mixing in certain proportions anthracite culm or coal with tar or pitch, either alone or mixed with small bituminous coal. The patentee prefers coal tar or pitch.

RAMSDEN, S. *Improvements in the construction and fixing of window-sashes.* Dated July 17, 1857. (No. 1987.)

Here, instead of the cords being affixed permanently to the sash, they are attached thereto by a self-acting lock. The lower part of the mouldings within which the sashes slide are made loose, so as to be removeable, and one of them is fastened in its position by screws, and the other by a flush bolt. To prevent the window cords from slipping away when the sashes are taken out, a clasp can be fixed in the window frame and made to press upon the cords, and thereby retain them in position.

until they are again attached to the sashes. By this arrangement window sashes can be easily removed from their frames.

ROBERTS, T., and J. DALE. *Improvements in obtaining pigments from dye-woods, and in the application of a pigment to printing paper-hangings.* Dated July 17, 1857. (No. 1988.)

This consists in obtaining pigments from dye woods, and the principle proceeded upon is to immerse in a fluid containing a substance which will take up the colouring matter as it is dissolved. Also in the use of barwood as a pigment, and in the application of a pigment obtained from barwood for printing paper hangings.

LACY, A. D., and W. C. HOMERSHAM. *Improvements in machinery for ploughing and cultivating land by steam or other suitable motive power.* Dated July 18, 1857. (No. 1989.)

This consists, 1st, in the transmission of the power from a prime mover to the rope, &c., employed to work the plough, &c., over the land by means of a capstan, around which only a few turns of the rope, &c., are taken, as distinguished from a drum on which the rope, &c., is wound; also such rope, &c., having a slack or tail, to be either coiled by hand or taken up on drums. 2. In the application of screw piles as means of fixing and giving the required stability to the portable winding apparatus and engine when they are employed, and also to the pulleys or mechanism required for the working of the actual rope, &c., which mechanism cannot be described without engravings.

CLIFF, W. *A new system of applying the air from the bellows and other means to the forge.* (A communication.) Dated July 18, 1857. (No. 1991.)

This consists of the suppression of the old pipe, and the substitution of a new one, through which the air is conducted by an orifice opening into a reservoir or air box, and by this means the wind acts perpendicularly beneath the substance to be heated.

WAINWRIGHT, G. J., and C. T. BRADBURY. *Improvements in apparatus for diminishing the amount of waste in the use of cops for manufacturing purposes.* Dated July 18, 1857. (No. 1992.)

Instead of the small tube hitherto placed on the spindle for building the cop upon in spinning and doubling yarns, the patentees use a partial tube; that is to say, they make it a little open, vertically or lengthwise, so that it can be easily placed on any part of the spindle. They also make the said partial tube with any number or shape of perforations, ridges, or indentations, which cause the yarn that is wound on the tube to bind it more firmly, and prevent the partial tube slipping out, or going further up the cop.

NEWTON, W. E. *Improved machinery for cutting metals or other hard substances.* (A communication.) Dated July 18, 1857. (No. 1993.)

This consists in dispensing with the top beam of rotary shears, and supporting the carriage on which the moveable blade is mounted entirely on the frame that contains the stationary blade, and by so gearing the carriage and rosary shear blade in it that their relative velocities can be changed, to produce the amount of drawing cut requisite for the machine to work to the best possible advantage.

NEWTON, W. E. *An improved construction of combined steam-boiler and radiator for warming apartments or buildings.* (A communication.) Dated July 18, 1857. (No. 1994.)

This consists in obtaining a portable steam boiler and radiator to warm a single room or suite of rooms by steam generated by the heat from one or more gas burners, or from fuel of any suitable kind. The construction of the steam boiler and radiator cannot be described without engravings.

BOLTON, R. *An improved mode of weighting the yarn-beam in looms used in the manufacture of cloth by steam power.* Dated July 20, 1857. (No. 1996.)

This invention cannot be described without engravings.

NEWBERY, G. J. *Improvements in window-blinds.* Dated July 20, 1857. (No. 1997.)

This consists mainly in the manufacture of imitation Venetian blinds, by combining an open or light fabric, such as net, constituting the ground-work of the blind, or the spaces between the laths with a thicker fabric, for the imitation laths, so that on rolling up the blind the imitation laths will become curved in the direction of their length, thereby producing a better effect, and strengthening the blind so as to prevent it from curling in at the sides, and becoming creased or puckered.

HOLMES, F. H. *Improvements in magneto-electric and electro-magnetic machines.* Dated July 20, 1857. (No. 1998.)

This relates to the helices and commutators or breaks of magneto-electric machines, and consists, 1. In making the helices of magneto-electric machines with moveable iron cores, which can be withdrawn and replaced with facility. 2. In making the divisions of the commutator or break employed in these machines of a curved or indented form, or in broken lines, so that

each of the contact rollers, in passing over any one of the divisions so formed, is always in contact with the commutator, whilst at the same time the curved or indented spaces between the divided portions of the commutator are made sufficiently wide to prevent dust or other foreign substances lodging permanently therein, and thereby forming a conducting medium between those parts that are required to be insulated from each other. 3. In a mode of obtaining a "compound current" from a magneto-electric machine, by arranging the helices with regard to the poles of the magnets, and the commutators with regard to each other, in such manner that out of two or more interrupted currents of electricity, one or more constant and uninterrupted or "compound" currents are produced.

NEWTON, W. E. *Improved machinery for feeding flour and mixing and kneading dough for the making of bread and biscuits.* (A communication.) Dated July 20, 1857. (No. 2002.)

The flour and water, &c., are supplied in thin films or sheets, and in close proximity with each other, and in continuous streams, at or near the periphery of a circular trough, where the operation of admixture begins, and where it can be carried on advantageously by means of rotating stirrers with fixed pins, whereby small quantities are acted on at a time; and as the operations progress, the matter, by the rotation of the stirrers, is gradually forced towards the centre, where the finished dough is delivered through an opening round the centre shaft, the supply of ingredients and the delivery of the finished dough being continuous until the required quantity of dough has been produced. The tendency of flour to "pack" is by this method obviated.

NEWTON, W. E. *Improvements in reaping and mowing machines.* (A communication.) Dated July 20, 1857. (No. 2003.)

This improved reaping and mowing machine combines various improvements which cannot be usefully described without engravings.

COWHAM, H. V. *Improvements in machinery for breaking or pulverizing land.* Dated July 20, 1857. (No. 2005.)

Each machine is constructed with an axis with wheels at the ends for adjusting the depth to which the tines or teeth shall penetrate the land. On the axis are naves, having projecting teeth, and turning freely, so that as the machine is moved over the land, the tines on each of the naves penetrate the earth in succession. Between each two naves there is fixed a tine, which is drawn through the land as the machine is moved along.

CONWAY, J. *Improvements in the production of copper rollers for printing calico and other fabrics.* Dated July 20, 1857. (No. 2006.)

Here, after boring, the copper cylinder is heated; a mandril, the ends of which project beyond the cylinder, is introduced; these ends are dropped into bearings fixed on a sliding carriage, which is advanced by screws until the copper cylinder is strongly pressed against an iron roll revolving by engine power. This exterior roll is slightly flattened on one side; and at each revolution when this flattened part comes in the line of the axes of the two rollers, the screws are tightened, and thus the copper cylinder is nipped between the mandril and roll and expanded.

BUTLER, S. *Improvements in the manufacture of ornamental bobbin net, net, or twist lace.* Dated July 20, 1857. (No. 2007.)

The object here is to produce wide breadths, with greatly extended ornament; and the improvements consist in dividing the pattern into parts, each of which is produced as what may be called a breadth, but with only part of a pattern thereon; yet so, that when the widths, with their separate portion of pattern, are removed from the machine, they will together produce the desired pattern.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

QUICK, J. H. *An improved hat.* Dated July 15, 1857. (No. 1965.)

This consists in forming hat bodies by the combination of an elastic band and brim with a crown of the ordinary materials of which covered hat-bodies are made. The band and brim are of plaited straw, grass, split cane, whalebone, or horse-hair, and are united by ordinary compositions to the crown.

BROOMAN, R. A. *Improvements in the manufacture of hats, bonnets, and other coverings for the head.* (A communication.) Dated July 15, 1857. (No. 1967.)

A wooden block of the shape intended having been obtained, the sides thereof are covered with a fabric previously saturated with gumlac and spirits of wine, the crown similarly formed and saturated is next applied and brought down just over the edges of the body; a brim of similar material is next put over the block and united to the body by a strip of fabric. When dry the foundation is withdrawn from the block to be coated with an adhesive composition made by boiling down

linseed oil, and adding finely-powdered white lead. The foundation is now taken in the left hand, and a small rod in the right; it is held under a sieve, from which is shaken wool or cotton in a state of powder or dust, the rod being applied to the hat, and the hat shaken for securing an even and regular adhesion of the powder all over the outside. After being dried in a stove the hat is ready for the trimmer.

GILBEE, W. A. *Improvements in the treatment of fatty matters for the manufacture of candles and night-lights.* (A communication.) Dated July 16, 1857. (No. 1975.)

This relates to treating neutral fats and oily acids by an excess of alkalies and superheated steam to produce a solidification of the oily products of the fats, producing thereby a larger per centage of solid matters available for the manufacture of candles and night-lights than is now obtained, and in the same operation converting the glycerine into available products.

VASSEROT, C. F. *An apparatus for measuring and registering the flow of liquids.* (A communication.) Dated July 17, 1857. (No. 1978.)

A funnel is formed at the top of a spiral pipe, and water, on being poured into the funnel, passes through the pipe, causing it to revolve, and give motion to suitable indicating apparatus.

AVERY, J. *Improvements in steam engines.* (A communication.) Dated July 17, 1857. (No. 1979.)

This relates to a method by which the free and latent heat, and gases of escape or waste steam of high and low pressure engines can be applied to the generation of combustion and heat. It is also intended to create a hot air vacuum into which the escape steam rushes freely, thus avoiding back pressure and dispensing with the use of the condenser and air-pump. The escape steam is led into a case embedded in the fire of the furnace, is there decomposed, and the hydrogen of it passes into the fire and is burnt.

BARLOW, C. *An improved brick-making machine.* (A communication.) Dated July 17, 1857. (No. 1980.)

This invention cannot be described without engravings.

BARWELL, W. *An improvement or improvements in casting metals.* Dated July 17, 1857. (No. 1982.)

This method of casting metals is especially applicable to the casting of hollow cylinders of copper, but is applicable for other purposes. In casting hollow cylinders used for the manufacture of tubes and printing rollers, the inventor makes a mould, and supports in the axis of the mould a core, and between the interior of the mould and the core the molten metal is poured in the usual way. He makes the mould of coarse sand mixed with horse dung, or chopped straw, and makes the core of a cylinder of the same materials, in the interior of which he prefers inserting a metallic rod for strengthening it. In order to make the mould and core more porous he pricks small holes therein. When the molten metal is poured in the air escapes freely through the perforations in the mould and core, and the casting produced is sound.

AUSTIN, J. *Improvements in machinery or apparatus for ploughing or cultivating land.* Dated July 18, 1857. (No. 1990.)

This relates to mechanical arrangements for working land by steam. Under one modification the machinery consists of a triangular open frame, supported upon wheels, and having at the forward end an upright steam engine and boiler. The overhead crank shaft is connected with the main forward ground wheel, which is ribbed to enable it to hold the soil. This wheel is also the steerer, being worked by a train of gearing from a steering wheel in the back of the frame. The extreme back of the framing consists of a pair of ploughing guides extending out transversely. This portion of the framing carries a set of four large wheels or chain pulleys, over which are passed two distinct endless chains or ploughing belts, fitted with ploughs, which, as the machine continually enters the ground in their bottom traverse, and emerge from it, return free in their upper back traverse.

WHYTE, A. *An improved mechanical arrangement for weaving.* Dated July 20, 1857. (No. 1995.)

This consists in using two or more reeds at the same time, and in communicating movement to the reeds, so as to give ornamental forms to the warp, and produce various patterns according to the arrangement of the splits upon the ribs of the reeds, and the movement given to the reeds. By this system, by being moved in opposite directions, the reeds will take the warp out of the direct line, which, being fixed by the weft, will leave a figure or pattern.

SMITH, H. *An improved agricultural implement for pulverizing and cleansing land.* Dated July 20, 1857. (No. 1999.)

This relates to an implement for crushing clods, and is intended to operate upon a breadth of about three feet, more or less. In front of the implement is a guide wheel, which also serves to regulate the depth of the soil to be raised. Behind the wheel and across the implement the inventor places

shares in the shape of knives; and behind them is an endless apron or belt. The back roller over which this belt travels is placed slightly in advance of two or more crushing rolls, from which the pulverised soil falls upon the onward motion of the implement; the shares enter the earth, take up the soil, and deliver it on to the endless apron, from which it falls after passing through the crushing rolls.

Brooman, R. A. *Improvements in the manufacture of pipes and tubes.* (A communication.) Dated July 20, 1857. (No. 2000.)

This relates to making copper tubes, and consists in a machine so constructed as to form the tube out of an ingot or casting by rolling it upon a stationary mandril, the metal being stripped from the end of the mandril by the action of the rollers as it passes between them.

Restell, T. *Improvements in breech-loading fire-arms, and in fastening the barrels of fire-arms to their stocks.* Dated July 20, 1857. (No. 2001.)

This consists, 1. In an arrangement of the breech of breech-loading fire-arms, which cannot be intelligibly described without engravings. 2. In forming the bands which connect the barrels of fire-arms to their stocks, as follows:—Each band is divided at its lower part by an inclined cut, a small screw being employed to connect the two parts. The improved band is driven on like an ordinary band, and when it is in place the screw is screwed up into the stock, and may be tightened at any time to compensate for the shrinking of the stock, or any other cause of slackness. To remove the band the screw may be partially withdrawn, and the two parts allowed to separate.

Maryon, R. J. *Improvements in the construction of propellers and in arrangements of engines for working the same for propulsion of ships or vessels.* Dated July 20, 1857. (No. 2004.)

This consists of a method of propulsion by double trunk propellers, consisting of one or two of the inventor's double trunks for aft propellers, and also two of his double trunks he arranges diagonally for backward action, one on each side of the kelson, which he works by eccentric lever, or crank motion clutched in gear with the main shaft, or connected by short end shafts, either worked together by a cross-head, or by alternate up and down stroke, striking the water at opposite times. The fore and aft double trunks he works either in a centre line of the vessel in a slot or aperture formed in the after run approaching the dead wood; but he prefers an arrangement on each side of the run, in which he forms a channel of a section of a circle, which is lost by the gradual incline of the dead wood to nothing, and therefore will not affect the ship when under sail.

Parsons, G. *Improvements in threshing machines known as combined threshing machines.* Dated July 21, 1857. (No. 2009.)

This consists in constructing the drum of threshing machines with circular or segmental beaters arranged stepwise, in constructing the shakers with solid bottoms so as to convey back the grain shaken from the straw to the hopper of, or to, the winnowing apparatus, and the inventor suspends the shakers at a point behind the drum. He also forms the sieves by punching down from the surface of a metal plate strips or tongues, which, being inclined, form not only passages for the grain to pass through, but also spouts to direct the blast from the fan for keeping the sieves clean. And he brings into the same hopper two pipes from the same fan or blower, one at the upper part thereof, and another lower down, whereby the winnowing is much improved. He also mounts a fan upon the drum spindle.

Arnall, J. C., and G. Greenhow. *Improvements in the manufacture of glass bottles and jars, and in the apparatus connected therewith.* Dated July 21, 1857. (No. 2008.)

This consists in making a screw thread inside the neck of the bottle, &c., during manufacture, without a second heating of the neck thereof, or another pair of tools. The apparatus consists of a spindle having a screw thread formed on its extremity, which is introduced into the neck of the bottle, &c., when under manufacture. This spindle rotates in a socket fixed to a pair of spring arms, somewhat similar to a pair of sugar tongs. These arms are fitted with two "keepers," which grasp and prevent the spindle from revolving when open, but when closed release the spindle, and permit of its rotating. The lower ends of the arms carry two revolving rollers, which press upon and shape the outside of the neck of the bottle, &c., and squeeze the metal thereof into the threads of the screw spindle.

PROVISIONAL PROTECTIONS.

Dated March 14, 1858.

498. Mark Smith, of Heywood, Lancaster, machine maker. Improvements in looms for weaving.

508. Jean Théodore Coupier, of Paris, chemist. Treating vegetable fibrous matters, to render them applicable for the manufacture of paper and pasteboard, and in apparatus connected therewith.

Dated March 15, 1858.

526. Josiah Aked, of Halifax, York, manufacturer, and John Crabtree, of the same place, overlooker. Improvements in the arrangement of machinery or apparatus for warping and beaming yarns for weaving.

Dated March 20, 1858.

588. John Talbot Pitman, of Gracechurch-street. Improvements in the manufacture of soap and in the apparatus connected therewith. A communication from C. Morfit, of Baltimore.

589. John Talbot Pitman, of Gracechurch-street. Improvements in the mode of preparing and moulding clay into bricks, tiles, pipes, and other similar manufactures. A communication.

Dated March 22, 1858.

594. George Davies, of Serle-street, Lincoln's-inn. Improvements in the metallization of objects for the electrotype or galvano-plastic process. A communication from C. P. Nézeraux, of Passy, near Paris.

598. James Wright, of Alfred-place, Newington-causeway. An improved method of, and apparatus for, punching rolled metal plates and angle iron. A communication.

Dated March 24, 1858.

622. William and Robert Wood, of Radcliffe, Lancaster, cotton spinners. Improvements in machinery or apparatus for spinning, doubling, and sizeing yarns or threads.

Dated March 25, 1858.

634. James Young, of Knaresboro', watch-maker. An improved apparatus for signalling on railways by day and night.

Dated March 26, 1858.

638. William Moxon, John Clayton, and Samuel Fearnley, all of Bluepits, Lancaster, engineers. Improvements in machinery for paying out electric telegraph cables, ropes, and other like articles.

640. Joseph Parkes, of Birmingham, manufacturer. An improvement or improvements in eyelets.

642. Robert More Butt, of Fairfield Works, Bow. Improvements in the manufacture of night lights.

Dated March 27, 1858.

646. Victor François Jeanne and Edmond Michel Germain Martin, of Paris. A machine for breaking stones.

650. Joseph Bushell, engineer, and Thomas Wright, tin-plate worker, of Manchester. Improvements which make grids for covering openings, through which fuel is deposited, in vaults or cellars, self-securing.

652. William Thomas Eley, of Broad-street, Golden-square. Improvements in cartridges.

654. Jean Antoine Victor Burq, of Paris, Doctor of Medicine. Improvements in weighing machines.

Dated March 29, 1858.

658. William Garnett, of Low Moor, Lancaster, cotton spinner, Christopher Geldard, of the same place, manager, and John Dugdale, of Blackburn, machine maker. Improvements in looms for weaving.

660. William Chadwick, of Bury, Lancaster, tin plate worker. Improvements in the hoods or tops, and in the footsteps and bearings of ventilators.

662. Joshua Horton, of Smethwick, Stafford, manufacturer. New or improved machinery to be employed in punching metals.

664. Jean Claude Durand, of Pimlico, engineer. An improvement in the manufacture of chain cables.

666. George Paterson, of Glasgow, engineer. Improvements in apparatus for effecting the combustion of fuel and the consumption or prevention of smoke, applicable to boiler furnaces.

668. William Davis and Thomas Harper, of Bristol. Improvements in apparatus for cutting soap.

Dated March 30, 1858.

670. Frederic Robinson and Edward Cottam, of Pimlico, engineers. Improvements in hydrostatic and other presses.

672. William Weallens, of Newcastle-upon-Tyne, mechanical engineer. Improvements in parabolic governors, and in the mode of applying the same to steam engines.

674. Thomas Steven, ironfounder, Thomas Reid, foreman moulder, and Thomas Frew, foreman pattern maker, all of Glasgow. Improvements in making moulds for casting.

676. Walter George Whitehead, of Birmingham, manufacturer. A new or improved waterproof paper.

678. William Oldfield, of Skipton, York, optician, and Thomas Ogden Dixon, of Steeton, in the same county, manufacturer. Improvements in gas-burners.

Dated March 31, 1858.

680. John Musgrave, jun., of the Globe Iron Works, Bolton-le-Moors, iron-founder. The application of the heat from the furnaces of singeing or dressing plates to generating steam and drying purposes, and improvements in the construction of such furnaces.

682. Joseph Warner Duce, of Wolverhampton, manufacturer. Improvements in locks and latches, and in attaching knobs to lock and latch spindles.

684. James Heywood Whitehead, of the Royal George Mills, Saddleworth, York, woollen manufacturer. Improvements in making woollen bags.

686. James Mercer, of Cambridge, United States. Improvements in the manufacture of leather.

688. Henry Napier, of Ardwick, Manchester, manufacturing chemist. An improved process in the production of volatile oil of resin.

690. Robert Peter, of Dundee, mill-manager. Improvements in gill machinery for the preparation or manufacture of textile materials.

Dated April 1, 1858.

692. Antonio Pelez, of Mortimer-street, Cavendish-square. Improvements in hydraulic machines. A communication.

693. Emile Augustin Colette, of Dieppedalle, near Rouen, France. Hashing meat with a mechanical chopping-board.

694. Arthur Perks Dadley, of New Hall-street, Birmingham, clasp manufacturer, and Nehemiah Brough, of Birmingham, machinist. An improved buckle or metallic adjuster for adjusting braces, belts, garters, and such like articles of dress.

695. Ferdinand Raphael Tavernier and Joseph Amédée Francis Tavernier, of Rue Saint Dominique, Paris. Improvements in machinery for combing wool or other fibrous materials.

696. François Jules Emile Oosterlinck, of Paris, gentleman. An improved valve or plug for the passage of water or other fluids.

697. Henry Ward, of Hamburg, engineer. Improved machinery for expressing liquids from organic substances.

698. William Edward Newton, of Chancery-lane. Improved machinery for manufacturing corks. A communication.

699. Henry Bentley, of Horton, near Bradford, York, manufacturer. Certain improvements in machinery or apparatus employed in preparing and spinning worsted and other fibrous substances.

700. Thomas Boardman, of Pendleton, Man-

chester, and John Allcock, of Stockport. Improvements in looms.

701. Charles Gourley Russell, of Manchester, lithographic printer. Improvements in machinery or apparatus for printing.

702. Thomas Frederick Robinson, of Halifax, York, cork-manufacturer. Improvements in apparatus for cutting cork.

Dated April 3, 1858.

703. Thomas Greenshields, of Little Titchfield-street. Improvements in treating ammoniacal liquor produced from coal in making gas, and obtaining useful products for making artificial manure.

705. Vincent Gâcheainé, of Nantes, France, engineer. An improvement in the construction of steam-engines for the use of vessels.

706. Antonio Pelez, of Mortimer-street, Cavendish-square. A circular cutter. A communication.

707. Antonio Pelez, of Mortimer-street, Cavendish-square. A new steam piston for horizontal and vertical engines. A communication.

708. John Henry Johnson, of Lincoln's-inn-fields. Improvements in ships' propellers. A communication from B. Hill.

709. Cooper Tress, of Blackfriars-road, hat manufacturer. Improvements in or applicable to the class of hats made from palm leaf, grass, chip, Tuscan, Leghorn, Panama straw, and other like materials.

710. John Fowler, jun., of Cornhill, engineer. Improvements in apparatus used when ploughing, tilling, or cultivating land by steam power.

711. William Crowley, of Newport Pagnell, Buckingham. Improvements in combining and working ploughs.

712. Duncan Morrison, of Birmingham. Improvements in boiling oils.

713. Henry Cartwright, of Broseley, Shropshire, farmer. Improvements in the construction of eccentrics, and in the mode of working them when applied to steam engines.

715. Samuel Minton, mining engineer, and Richard Handley Thomas, engineer, both of Clough Hall Collieries, Staffordshire. An improved construction of battery.

716. Robert Targett, of Windmill-street, Finsbury, glass and lamp dealer. Improvements applicable to lamp-glasses or shades.

717. Alfred Vincent Newton, of Chancery-lane. Improvements in machinery for cutting veneers. A communication.

718. John Stobbs and George Roger Hall, of North Shields. Improvements in pumps for raising water and other liquids.

Dated April 5, 1858.

719. William Clark, of Chancery-lane. An improved construction of water tank for ships and other vessels, and mode of applying the same on board a vessel, whereby it is capable of conversion into a float for saving life and property, in case of the foundering of the vessel. A communication.

721. Jules Clovis Dieulafait, of Rue Sainte-Appoline, Paris. An improved method of manufacturing garments, whereby one garment may be changed in form to that of several others.

723. Richard Coleman Henry Groombridge and Henry Groombridge, of Paternoster-row, publishers, and John Musselwhite, of Aldersgate street, accountant. Improvements in a black-board and apparatus for teaching music.

725. Oliver Sarony, of Scarborough, photographic artist. Improvements in producing photographic portraits.

Dated April 6, 1858.

727. William Bullock Webster, of Adam-street, gentleman. An improvement in the making of butter.

729. Edward Owen, of Blackheath, chemist. Improvements in the manufacture or production of artificial fuel, and in the application of the same to metallurgical purposes.

731. Richard Hornsby, jun., of Spittlegate Works, Grantham. Improvements in ploughs.

733. Herman Schwietzer, Joseph Holder, and John Broughton, of Brighton, manufacturing chemists. Concentrating and retaining the valuable properties of farm-yard and stable manure.

735. Denis Davy, William Bentley, and Joseph Davy, all of Bradford, York. Certain improvements in looms employed for weaving.

737. John Sangster, of Newington, nurseryman. Glazing in wood without putty.

739. Robert Hanham Collyer, of Marylebone, M.D. Improvements in the manufacture of paper. A communication from M. Nixon, of Philadelphia.

PATENTS APPLIED FOR WITH COMPLETE SPECIFICATIONS.

749. Elbridge Foster, of Connecticut, United States. A new and useful or improved life preserving berth for navigable vessels. Dated 7th April, 1858.

752. Stephen Orator Mason, of Connecticut, United States. Certain new and useful improvements in door-hinges. A communication from J. C. Mason. Dated 8th April, 1858.

753. Edward Richmond, of Massachusetts, United States. Certain new and useful mechanism for reducing, or reducing and crushing, and in various other respects treating grain, sugar cane, tobacco, or other substance or substances. Partly a communication from T. Blanchard. Dated 8th April, 1858.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," April* 20, 1858.)

3020. W. T. Henley. Improvements in ropes and cables for telegraphic or other purposes, and in machinery used in the manufacture of such and other ropes and cables.

3036. C. Nightingale. Improvements in machinery for feeding hair and fibres intended to be spun or twisted.

3038. W. J. Ward. Improvements in dyeing and printing textile fabrics and materials, and in apparatus connected therewith.

3047. J. Haddon. Certain improvements in the manufacture of wood screws, a portion of which is also applicable in the manufacturing of certain descriptions of nails.

3052. I. A. Best. A new or improved mode of manufacturing printing types.

3055. J. Tanton. Improvements in shepherds' crooks.

3057. J. Stather. Improvements in producing surfaces in imitation of wood for printing from.

3058. W. Denne. Improvements in apparatus used for lifting patients off beds and other surfaces used for reclining upon.

3060. J. Roberts and M. Beale. Improved machinery for obtaining and applying motive power, applicable chiefly to the working of ships' pumps and other mechanism on ship-board.

3062. F. Walton. Improvements in the manufacture of rollers used in machinery for preparing and spinning fibrous materials, and for other purposes where elastic pressure is required, also in the machinery employed in the manufacture of the said rollers.

3068. H. D. P. Cunningham. Improvements in reefing and furling sails.

3070. H. Bunting. Improved apparatus for obtaining and applying motive power.

3076. W. Smith. Improvements in chromotypographical printing presses. A communication.
3079. J. Chadwick. Improvements in rollers or cylinders for printing or staining the surfaces of woven fabrics, yarn, paper, and other materials.
3084. T. Howard. Improvements in machinery or apparatus for rolling iron bars, used in the construction of suspension bridges, and otherwise.
3085. G. A. Everitt. Improvements in the manufacture of tubes or cylinders of copper or alloys of copper.
3091. E. Hills. Improvements in the manufacture of white lead, and in the working up of the waste materials.
3095. M. J. and M. W. Turner. The improvement of conduit pipes and tubes for sewers, drains, conduits, gas, and other purposes.
3097. W. Blizzard. Improvements in the treatment of india-rubber by a new process for the manufacture of a chrystaline and colourless varnish for waterproofing all kinds of textile fabrics and papers without smell and without in any degree altering their appearance, and for making divers varnishes and paints.
3183. E. Gomez and W. Mills. An improved composition for trains or safety fusees and similar purposes.
3193. R. Harmer. Improvements in cigarettes.
285. J. Tall. Improvements in that description of carriages called perambulators.
384. W. Chadwick. Improvements in ventilators.
441. C. F. Vasserot. Improvements in the manufacture of wrought iron wheels for locomotives, tenders, wagons, &c. A communication.
569. T. C. Medwin. Certain improvements in the construction of water gauges for steam boilers.
587. W. E. Newton. An improved mode of treating and combining various combustible matters or substances for the production of artificial fuel. A communication.
606. C. Clifford. Improvements in ships' davits, and in apparatus for stowing, lowering, and securing boats.
641. J. Horton. An improvement or improvements in the construction of the girders used in the guide framing of gas holders.
674. T. Steven, T. Reid, and T. Frew. Improvements in making moulds for casting.
690. R. Peter. Improvements in gill machinery for the preparation or manufacture of textile materials.
709. C. Tress. Improvements in or applicable to the class of hats made from palm leaf, grass, chip, Tuscan, Leghorn, Panama straw, and other like materials.
749. E. Foster. A new and useful or improved life preserving berth for navigable vessels.
752. S. O. Mason. Certain new and useful improvements in door hinges. A communication.
753. E. Richmond. Certain new and useful mechanism for reducing, or reducing and crushing, and in various other respects treating grain, sugar-cane, tobacco, or other substance or substances. Partly a communication.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

816. James Templeton.
836. John Cowley and Daniel Peyton Sullivan.
841. Philippe Amédée Devy.
845. Edward Ellis Allen.
849. Henry Woodhouse.
858. John Lawson and Somerville Dear.
1045. George Taylor.

LIST OF SEALED PATENTS.

Sealed April 16th, 1858.

2648. David Guthrie and Josiah Vavasseur.
2657. Joseph Bentley.
2659. James Eastwood.
2660. Richard Archibald Brooman.
2664. Luigi De Cristoforis.
2666. Jean Schmidt.
2672. Henry Wimball.
2675. William Bentham.
2706. Alfred Vincent Newton.
2736. William Clark.
2750. William Padgett.
2770. Leon de Laudfort.
2778. James Lee Norton and Edwin Wilkinson.
2862. Henry Bessemer.
2912. Thomas Frederick Brabson and George Hughes.
42. Jules Alphonse Mathieu Chaufour.
284. Pierre Molinari.
370. Walter Kittredge Foster.

Sealed April 20th, 1858.

2681. George Horatio Smith.
2684. Charles Tooth and William Watkyn Wynne.
2689. Robert Duke.
2691. John Bethell.
2696. John Milne.
2699. James Smith.
2704. William Henry Hine Akerman.
2772. Johann Julius Schuessel and Peter Julius Thouret.
2775. Podromos B. Kyishogloo.
2782. Mathieu François Isoard.
2783. Charles Iles.
2837. Thomas Rowcliffe.
2897. William Smith.
237. Charles Askew and David Ritchie.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Dates of Registration.		Nos. in the Register.	Proprietors' Names.	Addresses.	Subjects of Design.
March	25.	4069	Griffiths & Hughes	Birmingham	Rule Joint.
,,		4070	Smart and Howland	Fenchurch-street	Smoker's Sweetheart.
	26.	4071	Rev. A. W. Noel	Cropredy	Reading Stand.
	,,	4072	W. Wilson	Manchester	Gas Light Reflector.
April	6.	4073	M. Lyons	Birmingham	Tag or Fastener.
	8.	4074	W. Herring	West Smithfield	Curved Tooth-brush.
	9.	4075	W. W. Rouch	Strand	Photographic Chamber.

12.	4076	Bridson and Pole	Lancaster	Distance Indicator.
14.	4077	A. Turley	Worcester	Needle-case.
17.	4078	T. Truss	Chester	Roof Lamp.
20.	4079	W. M. Staunton	Birkenhead	Spring Mattress.

PROVISIONAL REGISTRATIONS.

March 25.	970	B. Fletcher	Walbrook	Salvum Pipe.
29.	971	J. Cowley	Oxford	Washing Machine.
,,	972	R. B. Huggens de Lowendal	Chancery-lane	Spring.
31.	973	M. Hayes	Southsea	Ridges of Gun-barrels.
April 7.	974	W. Foster	Birmingham	Vent Peg.
17.	975	G. Turner	Packington	Improved Tile.
,,	976	J. F. Meston	Norfolk	Fruit and Blossom Protector.
,,	977	Gray and Bailey	Birmingham	Bottle or Roasting Jack.

NOTICE TO CORRESPONDENTS.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

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Mechanics' Magazine.

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Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London.

GRAHAM'S PATENT STEERING APPARATUS.

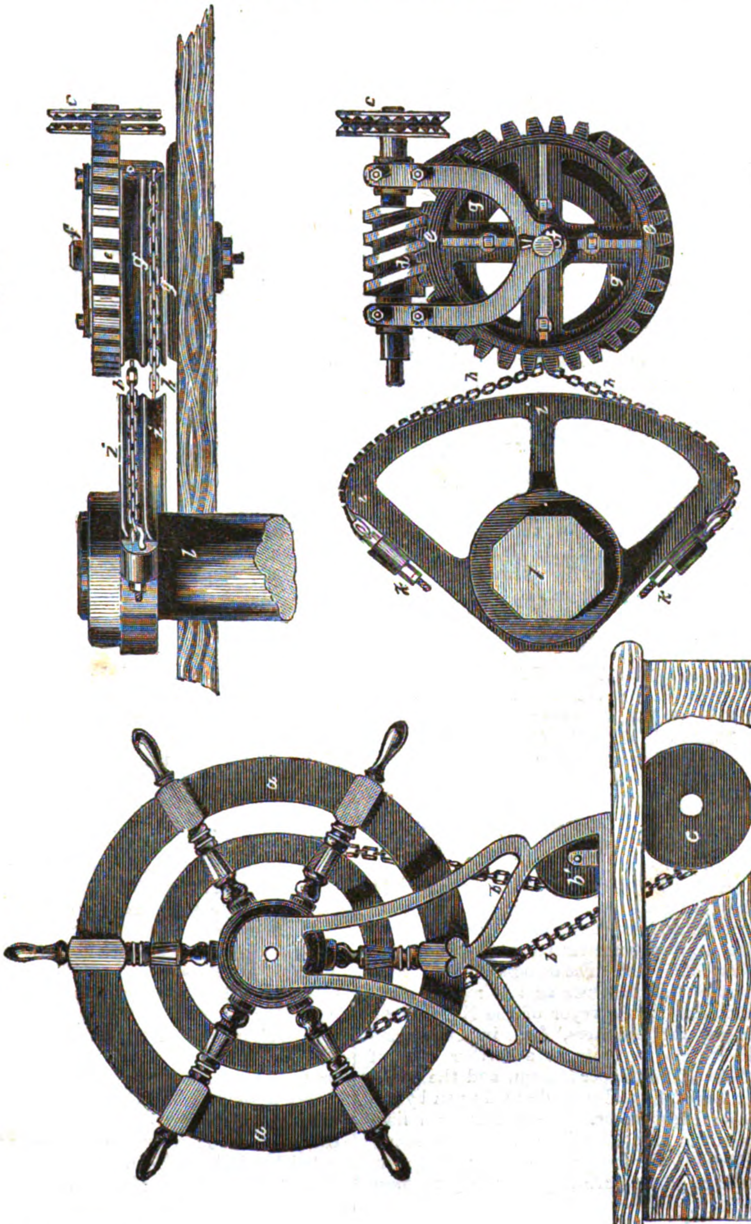


Fig. 3.

Fig. 2.

Fig. 1.

GRAHAM'S PATENT STEERING APPARATUS.

In a recent article upon the Brazilian gunboats built at Northfleet, we made mention of a patent steering apparatus with which they were fitted, the invention of Mr. Graham, of London. The object of the arrangement is to transmit the motion of the steering-wheel to the tiller or rudder-head without allowing the chains to become slack, in order to keep the rudder constantly steady, and also to increase the leverage as the rudder is brought "hard over," so as to enable the steersman to work the tiller without assistance in rough weather. We think the plan inferior (on account of its complication, and liability to be carried away by shocks of the sea) to that in which the same end is attained by a simple arrangement of pulleys, as in Kidman's invention; at the same time there are cases in which, as a matter of convenience, it possesses advantages. We have therefore illustrated it on the preceding page.

Fig. 1 is a front elevation of the steering-wheel with its chain and chain-wheel, whereby the motion of the steering-wheel is transmitted to the tiller and rudder; Fig. 2 is a plan of some of the gearing, and Fig. 3 is a side elevation of the same. *a* is the steering-wheel, which is of the ordinary construction. The rotary motion of the steering-wheel is transmitted by a chain or band *b*, *b*, to a chain wheel or barrel, *c*, below the poop deck, as shown at Fig. 1. The chain is kept properly taut around the barrel and chain-wheel by means of a bearing or guide pulley, *b'*. The wheel or barrel, is mounted on a worm shaft, *d*, the worm of which takes into and drives a worm wheel, *e*, mounted loosely on a fixed spindle, *f*, as shown in fig. 2. The spindle, *f*, is bolted fast to the deck beams, and is further secured by a framing attached to the deck. To this worm wheel, *e*, is attached a double-grooved eccentric pulley, *g*, which receives the chain or chains, *h*, from the tiller, *i*, and by its axial motion imparts the desired movement to the tiller, *i*, and by that means causes the rudder post, *l*, to turn on its axis, as is well understood. As the eccentric pulley, *g*, takes up and delivers the chain, *h*, at an unequal rate, it will be necessary to adapt the form of the tiller, *i*, to suit this inequality, and for that purpose it has given to it the form of an eccentric segment, as shown in fig. 2, which will deliver the chain at the rate it is taken up by the increasing radius of the eccentric pulley, *g*, and take up the chain at the unequal rate at which it is delivered. The tiller chain or chains, *h*, may be kept taut by means of adjusting screws, *k*, which work in lugs cast on the tiller, as shown in fig. 2. It may be desirable, when constructing this apparatus on a large scale, to drive the worm-wheel by a pair of worms, which will divide the strain and ensure greater steadiness in the action of the parts.

Memoirs of the Life and Services of Rear-Admiral Sir William Symonds, K.T., C.B., F.R.S., Surveyor of the Navy from 1832 *to* 1847 *: with Correspondence and other Papers relative to the Ships and Vessels constructed upon his Lines, as directed to be published under his will.* Edited by James A. Sharp. London: Longman, Brown, Green, Longmans, and Roberts. 1858.

The Navy Estimates, lately presented to the House of Commons by Sir J. Pakington, show that the annual expenditure of this country for naval stores is now no less than 1,395,450*l.* The disposal of the greater part of this immense sum is mainly committed to the Surveyor of the Navy. The wages for artificers, &c., in our home dockyards amounts to a further sum of about 900,000*l.* per annum, and the application of this also is decided upon by the same high officer. Every first-class line-of-battle ship that he builds costs nearly 150,000*l.* for hull and engines only; on each of our modern large class frigates more than 100,000*l.* is expended; and even our corvettes cost from 30,000*l.* to 40,000*l.*

We have only to mention facts like these, in order to indicate the prodigious responsibility attached to the post which the late Sir W. Symonds held for fifteen years. It is true that the application of steam to ships of war is much more general than in his time, and that the expenditure of the Department is accordingly greater now than then; but when due allowance is made for this, there still remains the fact that with his office he assumed the management of millions upon millions of the public money. When we add to this the consideration that Sir William was the greatest innovator that ever controlled the construction of ships in the British navy, the reader will not fail to approach with interest the professional history now before us.

We have not taken the trouble to inquire who or what Mr. James A. Sharp, the compiler of the work, is; for he has executed his task so indifferently that we feel no interest whatever in him. However

much a candid and educated writer might find it just to condemn in Sir W. Symonds and his system of ship construction, there certainly is ample room for a fairer portrayal and a more effective vindication of him than this indiscriminating and unqualified editor presents. Sir William was a keen, ingenious, persevering, and, in some respects, able man; and as he was, without question, both ambitious and successful, he might very well have been honoured with sober approbation. But Mr. Sharp, like too many modern editors and authors, tries to compensate for the weakness of his knowledge by the strength of his praise.

Sir William Symonds was involved in so many controversies with scientific men, respecting the construction of ships, that no man ignorant of the theory of naval architecture can possibly place his history in a true light. It must not be supposed from this that Sir William himself had any sound or deep knowledge of this science. Mr. Sharp, it is true, says of him that he "understood the theory, as well as the practice of his profession, and of the sciences upon which it is based" (p. 391). But Mr. Sharp gives us not the shadow of a basis for this statement, and is, indeed, himself so ignorant of the entire subject that if Sir William had been better informed than he was, Mr. Sharp could never have found it out.

Let us prove this. To do so we might quote a very imperfect and unsound dissertation from pages 105—110: but as this would occupy considerable space we will confine our attention to a lesser extract or two. In one place he says:—"It would be unpardonable in both constructor and artist not to know *the principle of the centre of gravity.*" In another we read:—"The figure of a ship has never been reduced to a theory, which has determined little or nothing that was not well known before." Mr. Sharp means the reverse of what he says here, since the passage is intended (as appears from the context) to disparage the theory of ship-building: if the reader will omit the word "never," he will see what Mr. Sharp tried to say. Again we read: "When found" (*i.e.*, the centre of gravity) "experimentally for the *Bulwark* and *Ajax* in 1817, under Dr. Inman, it took two persons one year to work it out for each ship." So far from such a time as is here mentioned being requisite for the operation, it may, in fact, be effected by one person in a few hours. We shall not enter upon an argument to prove this, since we gave a complete description of the experiment, and of the method of performing it, in an article upon the *Transit*, which was published in this Magazine for May 9th, 1857. Again he says: "In practice the displacement is found by noting draughts of vessels of equal dimensions at launching." A very little elementary knowledge would prevent a person from writing down such a very silly assertion. Again: "The labour attending these calculations" (of displacement and stability) "is to a great extent superseded by Mr. Edye's *Scales.*" Mr. Edye's "Scales" form a book, giving the weights of the several parts of a number of old ships, and of the various articles carried by them! Mr. Sharp must be credulous as well as uninformed, or he could not publish anything so ridiculous as this. Mr. Edye being now, happily, pensioned off, we venture to say his "Scales" will never more be heard of in such a connection. They have, probably, some value as a record of what once was: but even this is doubtful. On page 117 he says, in speaking of Sir W. Symonds' *Vanguard*: "It is worth remarking, to show how scientifically she was constructed, that while taking in her ballast, stores, guns, &c., various persons urged the Surveyor to make alterations in the stowage, to bring her down the more certainly, as they thought, to the line of flotation. He stuck to his own plans, however, and she floated at the very inches, fore and aft, predicted." It will be sufficient to say in reply to this, first, that the scientific calculation involved here was of a very simple nature—that of finding the depth of a solid of which the bounding curves and the volume were given; and, secondly, that, simple as it was, it is altogether improbable that Sir William himself ever made it, or could have made it. But, not to multiply instances needlessly, we will quote two of Mr. Sharp's remarks upon Mr. Edye, the individual whose "Scales" have been mentioned: "Speaking of this Committee, Mr. Edye—a very competent judge—says: 'In two or three cases they may have given a theoretical report on drawings; but I am not aware of any benefit that has yet been derived, or any *science that has been displayed* by them.'" And again: "'We are plagued to death,' says Mr. Edye, 'by the great number of theorists in naval construction, but there is not one in twenty that knows anything about it.'" Now, these citations of Mr. Edye as a competent judge of scientific matters are utterly fatal to Mr. Sharp's own pretensions, for this same Mr. Edye has been known throughout the service as a blustering, obstructive, rule-of-thumb personage only, who is said to have stuck

hotly to Sir William Symonds while it served his own interests, and coolly let go him when it did not. Indeed, so little faith have well-instructed persons ever had in this man that his long retention in office as nominal assistant to the present Surveyor of the Navy has afforded ground for the only complaint which has been made of the Department since the retirement of Sir William Symonds. It would have been well for his successor if Sir William had taken his *protegé* back with him into private life. To exalt the "science" of such a man, and to depreciate that of truly accomplished gentlemen, as Mr. Sharp does, is certainly preposterous. Carlyle has somewhere reminded us of the different estimates which were formed of the universe by two historical contemporaries—Newton, and Newton's dog Diamond; and whenever we meet with such criticism as Mr. Sharp's we always revert to the comparison. Between Newton's views of science and the dog Diamond's views of science all the views of commonplace individuals are ranged, and there can be but little doubt as to which of the two extremes the notions of Mr. Edye and Mr. Sharp lie near.

Having thus disposed of the Editor of this Memoir, let us now turn to the subject of it. From what we know of Sir W. Symonds we are able to state that he was, as we have already intimated, in many respects an estimable man. Especially was he deservedly esteemed in his profession—we allude, of course, to his officership in the Royal Navy. At the same time he was certainly not a philosopher. Among the more conspicuous of his failings was, we are bound to say, an overweening estimate of his own abilities. His correspondence and autobiography afford many proofs of this. Having been appointed First Lieutenant of the *Pique* in 1811, he speedily set to work to bring out both his own and his vessel's excellencies. "I was eminently successful," he says, "in improving the *Pique's* sailing qualities. She had been three times totally dismasted, and was an uneasy, leewardly ship; but in my hands her trim was altered, and she became one of the handiest and most serviceable ships in the Navy, and was celebrated for smartness and good order. The men would have it that she was as 'beautiful as an angel.'" (P. 38.) On returning to England in the same ship, in company with a large convoy under the *Swiftsure*, a hurricane of several days' duration was met with; "Every other man-of-war but the *Pique*," he tells us, "rolled and strained dreadfully; while she reached England *without stretching a yarn, or even cracking the whitewash; so very easy was she under her present trim.*" Sir William himself is manifestly "stretching a yarn" here! In another place he tells us that, at an earlier period, "The First Lieutenant of the *Endymion*, Lieutenant William King, took great notice of me, *and received much valuable assistance in his astronomical studies at my hands.*" These are early instances; but the same feature occurs scores of times throughout Sir William's accounts of himself. Another glimpse into the weaker phases of Sir William's character is seen in the following. On a certain occasion, late in life, he met with a rather serious accident, "and he esteemed the particulars," says Mr. Sharp, "to be of so much interest, *that he had a short narrative printed for the* USE *of his friends.*" This narrative runs: "On the 22d of September, 1846, Sir William Symonds, the Surveyor of the Navy, being on his return from an official visit of inspection to Pembroke-yard, embarked at Tenby," &c., &c. The truth of the whole matter appears briefly to be, that the steamer on board which Sir William was run into by another, the *Herald*, and he, being alarmed, and, moreover, anxious for the safety of two ladies who were under his charge, and sitting with him at the moment, seized hold of a rope belonging to the *Herald;* on the two steamers clearing each other poor Sir William found himself suspended from the wrong vessel, but was soon released from his unfortunate and somewhat absurd position. "Two female passengers proved kind Samaritans, as they bandaged his legs, and were otherwise attentive (*sic*) to his wants!" To complete the solemnity of the narrative, Mr. Sharp—dull Mr. Sharp!—adds: "A sketch of him in this critical" (*i.e.*, the suspended) "position was prefixed to the narrative."

We will not probe the weaknesses of the gallant officer further. We have said enough to prepare the reader for balancing the judgments we shall hereafter express concerning Sir William's actions and opinions, and more than this we have not the least desire to say respecting his defects.

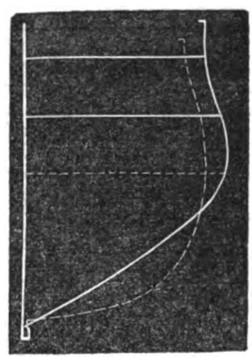
In the year 1819, Sir William Symonds, after 25 years' of naval life, and while still a lieutenant, was appointed Intendant of Marine Police at Malta, with which post were associated that of Captain of the Port, and sitting magistrate of the ports of the island. It was here that he first turned his attention to the designing and building of vessels, and launched his first craft; or, to use his own poetical language,

"In Malta I first took to naval construction;
In Malta launched forth my maiden production." *

His maiden production was called the *Nancy Dawson*, and he tells us that—"When the Hon. G. Vernon and his lady came to the island for her health, in their yacht, the *Transit*, I was introduced to them by more than one person; and we soon became very well acquainted. I made my first trial of the *Nancy Dawson's* sailing against his yacht, and had so considerable an advantage, that *I was led to believe that I had hit upon a secret in naval architecture;* and after trying my hand upon four or five others of a smaller description, which answered beyond my warmest expectations, *I was confirmed in the success of my principles by these experiments.* Great breadth of beam and extraordinary sharpness" (—sharpness of what?) "are the characteristic features of my system, with a careful attention to stowage, the stand of the masts, and the cut and setting of the sails; nor had I, in any instance, occasion to alter anything materially from my first idea. The consequence was, a firm conviction that I might attempt something on a larger scale, with every hope of success."

Upon this most slender basis was the whole fabric of Sir William's subsequent career built. The yacht gained him the notice of noblemen and others; then followed a pamphlet on naval architecture (in which the defects of many existing ships were pointed out, and great breadth of beam and rise of floor were advocated); then came a promise from the First Lord of the Admiralty, Lord Melville (obtained through the influence of Lord Lauderdale), that he should build a sloop of war on his plans, which he did, the vessel being called the *Columbine* (promotion intervening); then further patronage from the Duke of Portland, and the Duke of Clarence, the latter of whom, when he became Lord High Admiral, ordered him to lay down a 40-gun frigate (promotion again intervening); then the building of the *Pantaloon*, 10-gun brig, for the Duke of Portland, from whom the Admiralty purchased her; then the patronage of that most mischievous civilian First Lord, Sir J. Graham; then the order for the *Vernon*, 50-gun frigate; and then, in 1832, the Surveyorship of the Navy!

The characteristic features of Sir William's designs for ships were, as we have seen, great breadth of beam at and above the water line, and great sharpness of floor. The annexed engraving illustrates the difference between the sectional forms of his



Vernon and the *Barham*, the latter a frigate of the same class (nominally) as the *Vernon*, and one which may be taken as a fair example of the ships from which Sir W. Symonds' differed. The drawn lines are the *Vernon's*, the dotted, the *Barham's*. Another characteristic of Sir William's ships may also be mentioned (although it is really included in the first of those just named), viz., the smallness of the ratio of their lengths to their breadths.

It is too late in the day to discuss very elaborately the merits and demerits of these several features of the late Surveyor's ships, inasmuch as not one of them is any longer retained (in the construction of new ships) in the Royal Navy. The power of steam, the application of which to ships of war he so strenuously resisted, has swept his system entirely away. Sir William's ships increased in breadth very considerably at and above the water line—our present ships do not; the floors of his

* Sir William often indulged in versification, and not unfrequently with good effect. Having been requested by his friends to report on the real colour of the Black Sea, he says:—

"In winter all the squalls are black,
In black mists ships oft lose their track;
Black thunder lowers, and lightning flies,
And black clouds cover all the skies;
Dark bodings, dark anxiety,—
Black death, the sad catastrophe,—
Black deeds, too, may a reason be,
For calling it the blackest sea:
When clear the firmament is blue,
The sea reflects that colour too;
But when it overcast is seen,
The water's dark, and sometimes green."

The following professional lines resulted from his having seen a certain Russian ship built from the lines of a ship of our own navy:—

"How they came by her plan I am not aware,
But they get all our ships by means foul or fair.
It matters but little, for, if there be war,
We'll borrow them all, as we have done before;
And if they'll not lend them we'll take them galore,
And send them new plans to build us some more."

ships were excessively sharp—the floors of vessels now building are the reverse; the breadth of his ships was nearly one-third of their length—the breadth of those now on the stocks is less than one-fifth of theirs!

In the work under notice Mr. Sharp claims for Sir William's ships superiority to all others in respect of velocity, stability, stowage, strength, easy evolution, and economy; and he produces an immense mass of correspondence from naval officers to prove that his claims are just. But, in truth, such evidence, however voluminous, amounts to but very little; firstly, because the testimonials given seldom, if ever, relate to all the qualities requisite in a ship of war, while it is manifestly upon the whole of them taken together that her value really depends; secondly, because interested motives of innumerable complexions are allowed, consciously or unconsciously, to govern the decisions which officers in charge of, or attached to, ships pronounce upon them; and, thirdly, because the statements made in favour of the ships of one constructor are almost invariably counterbalanced by the equally strong statements made on behalf of those of a rival constructor. In illustration of the first of these points we may refer to the fact that during the entire term of office of Sir William Symonds not one of his ships was, so far as we can recollect, ever engaged in a battle by sea; and the complaint most often made of them was, that the extent and quickness of their rolling in a sea-way would render them quite unfit to maintain an action efficiently in anything like rough weather, should they be called upon to do so. In illustration of the second point we may mention that, during the Surveyorship of Sir William, many an officer obtained a command, and many more hoped to obtain one, by reporting strongly in favour of his vessels. This is a fact which cannot be cloaked. Even in the letters in the book before us, which have been sifted out of many by Sir William's own panegyrist, what do we find? "My son, who goes home in the *Firefly*," writes Admiral Louis, from Malta, 12th April, 1839, "to *try* and get employed, *and would be delighted to command one of your craft*, will deliver this to you, and will give you any information you may require about *Vanguard* (Sir William's ship)," &c. "I have always regretted," writes Captain Bennett pleadingly, 20th Dec., 1845, "I have always regretted that I was not held worthy to command a ship of your construction, because I thought I had ability *to do as much justice to one* as any of my brother officers," &c. In illustration of the third point we may refer our readers to two works lying before us at this moment—Mr. Fincham's very interesting "History of Naval Architecture," and Sir Charles Napier's "Letters on the Navy: its Past and Present State,"—in each of which they will discover accounts of Sir William Symonds' ships very different from those which Mr. Sharp spreads so copiously before us.

The motives which induced Sir William Symonds to patronize such a man as Mr. Edye, naturally enough led him to depreciate and oppose the members of the Government School of Naval Architecture, who had been guilty of acquiring a really scientific knowledge of their profession, and of thereby qualifying themselves to deal intelligently with his own pretensions. In this, however, he unquestionably committed a great mistake.

In no art is there greater room to combine with advantage the knowledge of the theorist with the results of experience than in the art of ship construction. Indeed such a combination affords the only true basis for the progress of that art; for without experience no man can possibly of himself discover in what degree certain qualities are or are not desirable in a ship; and without theoretical knowledge no man can possibly of himself determine how to supply what experience has shown to be requisite. The deduction from these facts is, that in the Surveyorship of the Navy the two elements—seamanship and science, practice and theory—should be united. This they at present are, in the persons of Sir Baldwin Walker and Isaac Watts, Esq. (his assistant), than whom, according to universal testimony, better representatives of the qualities could hardly, if at all, be found. It is true that here, as usual, the naval officer is before the man of science, in position,—a circumstance which, as scientific journalists, we may be expected to protest against. But, in plain truth, and on general grounds, we really cannot do so. We are well aware of the old arguments, and of the old jealousies too, which surround this subject. But we are also aware that, although the gentleman who now holds the subordinate post would undoubtedly adorn the highest office in any honourable service, and although here and there another mechanical officer might be found to fitly succeed him, yet we must confess with shame that such individuals are very rare exceptions to their class. Indeed, we need not be at a loss to show that that class is unfit, as a class, both for great power and for exalted position. No greater proof of this could be adduced than the fact of their

constant oppression of each other, which cannot, we think, be questioned. Indeed, we have in our minds, as we write, a transaction in which one of the most cultivated of the very school before named, when he came to possess a little brief authority, exerted that authority in putting to needless shame others who possessed as strong claims to respect, professionally, as ever belonged to himself. And yet this gentleman had grown grey in contending for the dignity of his calling! The spirit evinced by such acts must be eradicated from the breasts of mechanical officers before they are worthy to compete for social status with men of more gallant manners.

To return, however, to Sir William,—there can be no doubt that the wiser course for him would have been that of amicably availing himself of the knowledge of Messrs. Read, Chatfield, Creuze, and others of their class, in the carrying out of his ideas. Had he chosen to do this, and to have used the influence of his aristocratical amateur friends with moderation, instead of relying exclusively upon Sir James Graham and others, his career would probably have been a longer and more peaceable one than it was. On the other hand, it is highly probable that, had his impetuosity, and prejudices, and animosities been weaker than they were, he would never have had a public career at all.

INVALID'S COUCH.

INVENTED BY THOMAS GREENACRE, ENGINEER, MILLWALL, POPLAR.

This is a very useful contrivance, consisting of a bed or couch, an easy chair, a leg or foot-rest, and a night-stool combined in one. The back-board can be set to any angle, and held there either by the back and pall or by the set screws in the arms. As the back rises or falls, the arms always keep level. The leg rests can also be raised or lowered, either together or separately, and kept in position by the segment and set-screw; and the foot-boards can be adjusted to any length by the nuts underneath. The pan is

held up by two small catches, and is easily removed. The wheels can be taken off in a few seconds, and the springs can be adjusted to carry any weight. The india-rubber bed has each compartment arranged to fill separately from the other, so that one or more can be made much firmer than the others if required. The cushion in the centre is put up from below after the pan is removed, forming one fair surface on the top of the bed. Not a word need be added in commendation of an article of furniture constructed to afford to invalids so much ease and comfort.

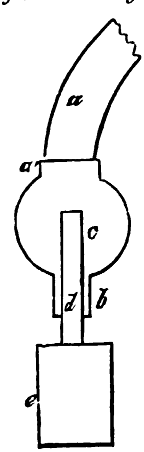
STREET FOUNTAINS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—In many towns in England there have been lately erected fountains in the public streets, at which the passers by may partake of a cup "which cheers but not inebriates." I believe the first of these was erected by Mr. Rathbone, of Liverpool, who, with the liberality which distinguishes him in all his actions, presented his townsmen with several of these fountains. His example has, I believe, been followed by many others; and in the town in which I live eight fountains have been presented to the public. In several towns (this for one) the Water Companies supply these fountains gratis; in others, a rental for the use of the water is charged. Under the present method the water is continually (and, of course, at times, when not wanted, uselessly) running. The Companies, who supply the water gratis, turn the water off at a stated time in the afternoon, thereby depriving a thirsty traveller passing afterwards of a cooling draught. I have invented a contrivance, whereby the water would never run to waste, and I have little doubt, if it were applied, the water Companies would in all cases supply the water free of charge, and would have it always on, as it would never be wasted. I enclose a sketch of my plan, and if you think it of any value you will probably publish it *pro bono publico.* I may state that the contrivance would only cost a few shillings for each fountain, is simple, self-acting, and would not be likely to get out of repair.

Yours, &c., J. T.

References to Figure.



a, pipe from fountain; *b*, pipe screwed to *a* at *a'*, and attached to a cock, *c*; *d*, lever with a weight, *e*, attached, sufficiently heavy to restore it when moved to its position, as shown in the engraving.

In using this, the cup attached to the fountain is pushed against the weight, *e*, until the cup comes under the pipe *b*, when, the cock being thereby turned round, the water flows into the cup. J. T.

EXHIBITION OF INVENTIONS AT THE SOCIETY OF ARTS.

(*Continued from page* 345.)

Specimens of Irregular-shaped Timbers are exhibited by Kinder, McNaught, and Smith, of Worcester.—These timbers are produced by the wood-shaping machine recently patented by Mr. Arthur Kinder. This machine can perform the operations of sawing, boring, morticing, surfacing, either on the flat or curved work, producing regular, irregular, or winding bevils, tenons, grooves, rebates, &c. It will also saw ships' timbers to the proper shape at one operation.

Improved Method of Cutting and Shaping Spokes; B. Beale, Lambton-terrace, East Greenwich.—This consists in cutting or shaping the spokes while revolving round or oscillating on a centre eccentrical to the centre of the spoke. The tenons are cut, and the shaping of the spoke completed at the nave end on the same principle. This operation may be performed by placing a number of spokes at a proper angle on a sliding table, and passing them against suitable cutters. Spokes of various kinds are exhibited.

A Foot Lever Press by R. Houchin, Bridport-place, New North-road, Hoxton. —This machine is used for fixing and closing eyelets. It enables the workman to have both hands at liberty to hold and adjust the work, while pressure is obtained by the foot.

Silk Throwing Machine; B. A. Murray, Trinity-place, Trafalgar-square.—This machine produces weft in one operation, and warp or organzine in two operations from the cocoon or skein.

Metal and India-rubber Picker; H. Heald, Sabden Whalley, near Blackburn.— It is stated that pickers of this description will last twice the ordinary time, and when the india-rubber is worn out it may be renewed at a small cost. By the use of this picker, the damage to the cloth, so frequently caused by pieces of the old picker flying into it, is prevented. (For illustrated description see *Mechanics' Magazine* for August, 1857, No. 1775, Vol. 67.)

Rope Machine; A. Smith, Princes-street, Leicester-square.—The peculiarity of this machine consists in the arrangement of the reels containing the wires or strands, which are required to be laid together so as to form strands or ropes in the centre of a revolving frame of small diameter, in such a manner that all motion to the reels and their contents and frames, as well as all twist or tortion to the individual wires or strands, is avoided.

Improvement in Connecting the ends of Submarine Telegraph Cables; Captain W. B. De Blaquiere, R.N.—This invention was described at p. 280, No. 1806, Vol. 68, *Mechanics' Magazine*.

Apparatus for Paying-out Submarine Telegraph Cables; L. Gisborne and H. C. Forde, Duke-street, Adelphi.—In this apparatus (which was recently exhibited at the Institution of Civil Engineers) the cable is passed over a pulley, which is carried by an arm suspended from a universal joint immediately over the centre of the coil, and it has also another universal joint near the pulley; thus the arm can oscillate in all directions, and the pulley can follow the succeeding coils in which the cable is laid in the vessel. The cable next passes under a stationary pulley, and then over a drum (which is governed by a break), worked with levers, around which drum it takes several turns; the cable then passes over a pulley, and descends under a moveable pulley which is weighted, and has a quantity of chain attached to it, and when the strain comes on the cable it draws it more and more nearly into a straight line, lifting at the same time the weighted pulley, and so becoming subjected to a continually increasing weight. The cable lastly passes over two guiding pulleys to the stern of the vessel. On the upper coils of the cable are placed numerous spherical weights, and they at all times keep a slight strain on the cable, and prevent it, as it runs out, from drawing up portions of the coil with it.

Patent Corrugated Grooved Wheel, for submerging Submarine Telegraph Cables, driving Machinery, &c.; C. and G. Johnson, East-hill, Wandsworth.—The periphery of this wheel has a deep channel, the sides of which are inclined at a small angle, and are corrugated. The rope to be payed out, being passed round this wheel, receives a series of grips from the corrugations.

Chambered Graving Dock; R. R. Grantham, Great Scotland-yard.—The dock is 500 feet in length, 60 at the entrance, and 30 deep. It is divided by two or more caissons, placed in the grooves. The object is to accommodate two or three vessels at the same time, according to their lengths, so that the repairs of one or more can be proceeded with while the others can be taken out of and put into dock.

Patent Sluice for Canal Locks; Lawrence Brothers, City Iron Works, Pitfield-street.—In this invention the pressure of the water against the sluice is made to assist in raising it.

Patent Enclosed Screw, &c., for Auxiliary Steam Ships; J. M. Hyde and Co., Cumberland Iron Works, Bristol.—This screw is perfectly enclosed within the run of the ship, by sliding plates fitted into grooves, and falling like flood hatches by their own weight; it offers no resistance when the ship is under canvas, and by raising these slides it can be at once brought into use.

Patent Iron Masts and Yards; J. Hodgson, Sweeting-street, Liverpool.—In this invention the ribs are outside, and may be made by rivetting angle iron to the plates, or by bending the edges of the plates outwards, and then rivetting them. These ribs increase the diameter of the base of the mast, give strength, and enable the rivetting to be done by steam.

Finch and Lamport's Patent Iron Mast for ships; Finch and Heath, Bridge Works, Chepstow.—These masts are made with a joint at the deck, by means of which they may be immediately cast overboard in cases of extreme necessity, and this joint is the strongest portion of the mast under ordinary circumstances. The masts may also be made without this joint.

New Method of Lowering Ships' Boats; C. Clifford. See *Mechanics' Magazine*, page 97, No. 1747, Vol. 66.

Patent Safety Apparatus for Preventing Boats from Capsizing; M. Grouse and Co., Oxford-street.—This consists of a pair of tie-rods, and a rope, which suspend a weight at a considerable depth below the keel of the boat. The tie-rods being hinged to the sides of the boat allow the weight to be raised as the boat approaches the shore.

Bell Buoy; G. W. Lenox (Brown, Lenox, and Co.), Billiter-square, City. See *Mechanics' Magazine*, page 289, No. 1807, Vol. 68.

Patent Mariner's Time Compass; R. Reeder, Southampton-buildings. This instrument, which is a combination of a universal dial and chronometer, has been constructed to take any horizontal bearing in any latitude, at any hour of the day. It is also intended to solve those problems which can be solved by an armillary sphere, or by spherical trigonometry—so far as its circles and their motions extend: and it will be also found to supply the place of the magnetic needle.

Patent Ship, Signal, and Harbour Lamp;

J. W. D. and G. G. Brown, Wickham-terrace, New-cross, Deptford. The lenses used in the construction of these lamps possess the property of diffusing light, instead of concentrating it, like the ordinary circular lenses. See *Mechanics' Magazine*, p. 354, No. 1757, Vol. 66.

Self-acting Ice Indicator; N. M. Cummins, Annmount, Cork.—The object here is to indicate to navigators the proximity of floating icebergs, when, through fog or darkness, they are not visible. Whenever the vessel approaches an iceberg, the decreasing temperature of the water in its neighbourhood (for a distance ranging about two miles) will cause a thermometric rod to contract and set the alarum in action.

Hospital and Field Tents; Capt. G. Rhodes, 94th Regt., Chatham.—The canvas of this field tent is supported by radial ribs, the upper ends of which are secured to a central head-piece provided with sockets to receive them. The lower ends of the ribs enter loops in an endless circumscribing cord or ground rope, which is pinned to the ground by tent-pegs. The hospital tent is constructed on a similar principle, and may be made of any required dimensions. A ridge-pole is introduced between two head-pieces, which are carried by radial ribs, and bent ribs are passed upwards from the looped ground-rope to fit into sockets attached to the ridge-pole.

Patent Mortar; Captain T. A. Blakely, R.A.—The peculiarity of this mortar consists in the whole being made in concentric layers, each slightly compressing that within it, so that, when the strain comes, all may be strained nearly equally. In a cast mortar the interior must be strained much more than the exterior. It is stated that this arrangement gives greater strength at a cheaper rate, and affords facilities for making ordnance of a size hitherto found to be impossible.

Decimal Measures of Length; J. Simon Holland, Woolwich.—These measures are founded on the 16th of an inch as the basis. The two rules are marked with the present inches and eighths. The fathom measure is 1,000 "steens," or sixteenths, long, and intended for the use of surveyors, builders, &c. See *Mechanics' Magazine* for March 27, 1858.

Model of a Farm, under Burcham's Circular Method of Tilling Land by Steam or Horse-power. This system of agriculture subdivides the entire farm into small plots or circular allotments (either half acres or acres). A steam-cultivating platform is then made of a length suitable for executing any required operation by a circular sweep over the surface of each plot.

Dr. Guyot's Patent Straw Mat Weaving Loom; Agent, S. Sidney, Great George-street, Westminster. See *Mechanics' Magazine*, p. 481, No. 1789, Vol. 67.

Patent Adjustable Scythe; Payne, Kirkcudbright.—This scythe is adjustable by means of nuts and screws, and is so arranged that the blade will shut up like a knife. The short handles are moveable up and down the snaith, and fixed by simply screwing them round with the hand.

Horizontal Wind-mill; D. Davis, Woodchurch, near Tenterden.—This mill has four horizontal sweeps, with shutters, which spontaneously shift so as to be driven round by the wind, whatever quarter it may blow from.

COLOURS OF THIN PLATES.

To the Editors of the Mechanics' Magazine.

Gentlemen,—The cause of the colours of thin plates has never yet received any perfectly satisfactory explanation. Newton thought that the rays of light are put into a sort of transient state while passing through refracting surfaces, which in the passage of the ray returns at equal intervals, and causes it at every return to be easily sent through the next refracting surface, and between the returns to be easily reflected by it.

In the undulatory theory of light the colours of thin plates are supposed to arise from the interference of the light reflected from the second or under surface of the plate with the light reflected from the first or upper surface.

Now I think that both these theories are (the first especially) rather improbable, and that all the phenomena already noticed can be explained upon the principle of the prism. With regard to the colours of mica, mother-of-pearl, and gypsum, we know that their structure is lamellar, and I conclude that the semi-transparent plates or layers which form these bodies divide the rays of light which fall upon the same, the surfaces of their plates being uneven and acting as a prism does. When we breathe upon a piece of glass, or scatter dust or any fine powder upon it, and look at the sun through it, or through a feather, we see colour, which is also the case even when looked at with the naked eye. This is, I imagine, occasioned in the first instance by the globules of moisture decomposing as a rain-drop or prism does the rays of light; in the second by the uneven surfaces of the atoms of dust which, from their small size,

are more or less transparent; and in the third by the transparency and unevenness of the surfaces of the different parts of the feather, which is similar to before. It cannot, I should think, be doubted that raindrops act precisely as does a prism. The moisture of the eyes and the lids acting as feathers explains the last phenomenon. Such a hypothesis, which may be called the prismatic theory, appears to me to explain how that when mother-of-pearl is ground down with the finest powders and polished to the utmost degree of brilliancy it is impossible to rob it of its colours, thus proving that they do not depend upon the state of the surface, but, as I suppose, upon the uneven layers which compose the whole. It has been said that the communication of its colours to other surfaces upon which it is impressed is the necessary consequence of the communication of its superficial structure; but this strikes me as being a very imperfect and unlikely conclusion when we consider that its surface has been artificially produced. It seems to me far more probable that a thin layer has adhered to the substance with which it has been in contact.

I think that the colours of soap bubbles arise from the want of parallelism of their surfaces, and vary according to the thickness of the watery film. The same applies to thin plates of air. When surrounding lenses their surfaces are necessarily uneven, so that according to the curve and space occupied are the series of coloured rings. It appears to me, then, that the absence of parallel surface is the one and only cause of colour, and if this be acceptable I will consider the above theory in relation to the colours of thick plates.

I am, Gentlemen, yours, &c.,

J. A. D.

April 6, 1858.

INVENTORS AND THE GOVERNMENT.

To the Editors of the Mechanics' Magazine.

Gentlemen,—In a late number you recommended "Neptune" to take out a patent for his invention, and to submit it to the Admiralty in the ordinary manner. Before doing so, let me suggest to him to peruse some of Mr. Drake's letters to you, which prove that he has for years been vainly attempting to obtain a fair hearing for some suggestions evidently containing valuable elements. Let "Neptune" further reflect on the long, wasted life of Capt. Norton—wasted because he had the misfortune to invent a rifle bullet combining the advantages of that now in use—the Enfield (!) rifle—and others which Colonel Jacob and Mr. Armstrong are now employed in developing. Let him think of the reward Carpenter received from a grateful country for the invention of the screw propeller, or on the honours showered on Cort and his descendants for, perhaps, the second of all modern discoveries. Let him go to the Kensington Museum and see a beautiful brass screw-propeller there, which cannot escape his notice. This was made by Whitworth on Bennett Woodcroft's patent—the increasing pitch—and "*submitted to the Admiralty in the usual manner.*" No, I am wrong. It had been ordered by the Admiralty for trial in the *Dwarf*. It was sent to Woolwich Dockyard, where the *Dwarf* was, remained there four years, but was never put into the water. By a simple contrivance of Mr. Whitworth's this screw could have the pitch altered to any angle from within the vessel; yet while it was lying at Woolwich the Government had twelve screws of different pitches tried, which, of course, could only give approximately the result Whitworth's one could have given accurately. Mr. Bennett Woodcroft got four years' extension of his patent; his invention, however, did not come into general use till the year after even this extension terminated. Does this encourage "Neptune"? If it does, I have a more recent case for him, where a gentleman first went to great expense to lay an invention before the Government, but, finding he could not get a hearing, took a patent. He then made some experiments, and Lord Panmure's advisers declared the plan dangerous and not worth the trouble of even witnessing experiments though at the inventor's expense. Nevertheless, he proved by subsequent experiments and by calculations that he was right, and the invention was adopted. Lord Panmure acknowledged that the proposer had been the first to lay the subject in a complete theoretical form before the Government, also that he had the merit of practically bringing it forward, but refused any reward, because a proposal having a slight superficial resemblance had been privately made to the Government in 1807, and suggested to the patentee to go to law. The latter submitted Lord Panmure's letter to a Q.C. of high standing, whose opinion was, of course, that a mere proposal in 1807, even if identical with the late patent, could not invalidate it, unless there had been some publication, but that a patentee cannot bring an action against any officer of the Crown.

The Patentee communicated this opinion to Lord Panmure, and offered to abide by the decision of any barrister to be named by Lord Panmure. His Lordship, finding

he could not by a quibble of the law resist a just claim, determined to act arbitrarily, and refused all arbitration. The patentee laid his case before Lord Palmerston, and it is but just to add that he received an assurance that it would have been inquired into but for the change of Ministry. Now, after nearly four years' worry, he anticipates getting, perhaps, one-half the money he has spent back. I enclose my card, and you may give my name and address to any one wishing it, on condition that he gives me his in return.

I am, Gentlemen,
Your obedient servant,
B. W. O. D.

MACHINERY FOR THE MANUFACTURE OF BISCUITS.

BY W. G. H. SLIGHT, C.E., EDINBURGH.*

The object of this paper is principally to illustrate the mechanical appliances now in use in some of the best and most extensive biscuit manufactories in this country and abroad for the production of ship and other biscuits cut out of sheets of dough. The simplest form of machine, as used for ordinary shop trades, consists of a pair of rollers mounted in a metal frame, and worked by hand, by which the dough, previously mixed and kneaded, is worked and rolled out to a sheet of uniform thickness, after which it is cut out into biscuits by simple hand cutters. An advance in the application of hand machinery is where a machine is employed for cutting, of one of the kinds mentioned below, after the dough is rolled out by the first machine. A complete set of machinery to work by power consists of different machines for the various operations of mixing, kneading or braking, cutting, and in some cases baking, or passing the biscuits through the oven. Mixing is performed either by a set of knives or rakes revolving within a close cylindrical vessel, or by a revolving flat pan, in which a heavy metal roller rests and turns, working and squeezing the ingredients into a mass of dough. Braking is usually performed by a single pair of rollers, fitted with a reversing motion, between which the dough is passed backwards and forwards until sufficiently worked. Of cutting machines there are two forms employed, the most expeditious being the cylinder machine, so called from its having the cutters mounted on the surface of a roller or cylinder. This cylindrical cutter revolves in contact with a plain metal roller, and as the dough passes between them it is cut into biscuits, which are delivered in front of the machine, either on boards or on tins ready for being placed in the oven, while the waste or scrap is carried away behind. In the other arrangement of cutting machine, the dough rests on an endless web after being rolled out to the proper thickness, and passed underneath a set of cutters working up and down; the the web and dough stand during the cut, and move forward the breadth of the biscuit on the rising of the cutter. The most perfect form of this machine has a web for removing the scrap after the dough is cut, and the biscuits are slidden off the main web to a tin moving forward at the same rate on a third web underneath. The application of machinery to baking is in the moving of the biscuits slowly through a long oven; they, being put on an endless chain of plates or web of wire-cloth, passing right through the oven, are delivered baked at the other end.

* From the Official Report of a paper read at the Royal Scottish Society of Arts.

PRESENCE OF WATER ON THE MOON.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Although the uneven surface of the dark portions of the moon may be regarded as almost irresistible proof that they are not water, inasmuch as it is not probable that a sea should be so besprinkled with rocks, even considering the blistered nature of the land, I cannot subscribe to the following reasons which are advanced to prove the absence of liquids.

It is said that the fact of faint stars being seen near the lunar surface, with undiminished light, proves that there is no water on the moon; because, if there were water, it would be converted into vapour all over the hemisphere upon which the sun exerts its heat, and that this would make the light of faint stars dim as the moon appeared in front of them.

Now, granting that the light of stars thus circumstanced is undimmed, as asserted, I conceive that "if" the moon has no, or at any rate a very attenuated atmosphere surrounding it, as we have reason for concluding, it would be impossible for water to be vaporised, inasmuch as such an atmosphere could not support any mist which the sun would tend to produce.

Again, it is said that it is not possible to conceive that water could remain exposed to intense sunshine for fifteen days and nights, on a sphere where there is no atmospheric pressure to help to keep it condensed, without being entirely vaporised. My former reply anticipates this, and from the objection stated I cannot suppose, with Sir John Herschel, that all liquids upon the bright hemisphere would be vaporised

and, rushing to the vacuum over the dark hemisphere, be instantly condensed.

I am, Gentlemen, yours, &c.,

J. A. D.

April 6, 1858.

ON THE MOON'S ATMOSPHERE.

To the Editors of the Mechanics' Magazine.

Gentlemen,—May I venture to offer to your gallant correspondent, General Thompson, M.P.,—whose mind appears to be as philosophical as his heart is known to be patriotic,—a thought, *quantum valeat*, in consonance with his opinion?

If, on the surface of the moon, there is none of what I have to deal with—*water*, there appears to be an abundance of what gentlemen of his profession delight in—*fire*.

Can combustion be carried on without an atmosphere resulting? Aqueous spherules there may be none, but what becomes of the elements liberated by burning? We know they cannot be *annihilated*. If they do not form an atmosphere, I am so ignorant of such subjects as to be unable to determine what becomes of them.

Nauticus.

AN IMPROVED ANEMOMETER.

To the Editors of the Mechanics' Magazine.

Gentlemen,—I think that the following instrument would be an improvement upon common anemometers, at any rate upon those which are constructed according to the principle of Mr. Woltmann's steam gauge. These, being rather complex affairs, engender a considerable amount of friction, which it is my object to avoid by attending to simplicity of construction.

Let a thin piece of metal be made into a figure resembling the mouth of a trumpet. This should be firmly fixed upon a stand, and a piece of wood covered with some soft substance, as leather, should be made to remain tightly against the small aperture of the metal, which should be flat to receive it. The wood should be sustained by a wire supended from an upright placed in the stand, and a pivot projecting from the outer side of the wood should move the lower end of a leverage apparatus similar to that of an ordinary pyrometer.

This instrument, although essentially different from Mr. Woltmann's, which consists of a framework of sails, would act as a steam gauge, although it is perhaps better fitted for the former office. The mode of action is obvious.

I am, Gentlemen, yours, &c.,

J. A. D.

April 8, 1858.

SUBMARINE TELEGRAPH CABLES.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Your Magazine of April 10th, containing an abstract of my paper on Submarine Telegraphs, has just come into my hands, and I perceive two errors (not of your making) have crept in.

In paragraph 3, when alluding to induction in gutta percha wires not following precisely the same law as it does with flat plates, it should have been "Mr. C. F. Varley had tried some experiments which went to show," &c., and not C. J. Varley.

In page 339, and in the last sentence but one, it should have been in the case of a *suspended wire* that, as no induction worth naming could take place, there could be no accumulation of statical change worth noticing, the whole impetus was, therefore, directed forward and not diverted laterally; consequently signals were found for all practical purposes to pass instantly, and not, as it appears in your Magazine, in the case of a submarine wire.

May I ask you to be so kind as to cancel these errors in a future number, as they may mislead.

I am, Gentlemen,

Your obedient servant,

Alfred Varley.

7, York-place, Kentish-town, N.W., April 17, 1858.

PROPOSED WORKING POWER ON THE METROPOLITAN RAILWAY.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Can any of your correspondents or numerous readers enlighten me as to the proposed mode of working the traffic on the Metropolitan Railway. In their advertisement the Directors state their "locomotives will be moved by steam generated from heated water carried with the engines," in order to avoid fumes from furnaces, which would be too annoying in so long a tunnel as theirs; in fact, the number of trains (every three minutes each way) would render the atmosphere suffocating. Seeing that 1,000 degrees of heat become latent in steam, I cannot comprehend how it is possible to obtain steam beyond a very limited puff from any amount of "heated water," or else why are engineers striving to increase to so great an extent the heating surface of boilers? I thought myself a practical engineer, but working railway traffic with locomotives charged with "heated water" seems to me beyond the bounds of practicability.

I am, Sir, your constant reader,

John Nelson.

28, Montague-street, April 26, 1858.

SEAMLESS, OR GOSSAMER BAG CARTRIDGES.

Captain Norton has forwarded us the following letter for publication. It was originally addressed to the Editor of the *Military Spectator*:—

"In experimenting with the Ordnance seamless cartridge of paper made from the pulp in a mill, I find that the mucilage employed to give it tenacity causes the fragments to remain in the barrel of the gun, after firing, this is easily proved by firing one from Cooper's breech-loader. I make my bag cartridges of thin linen or calico-cloth, or *net* charged with gun-cotton; when the breech-loader is fired the cloth of the cartridge is carried out of the barrel altogether, and whatever *acid* is left by the explosion of the gun-cotton is *absorbed* by the calico bag, leaving the barrel as clean as that of an air-gun.

"About fifteen years ago Lord Cardigan fired some of my seamless cartridges from a dragoon's pistol in his house in Grosvenor-square; but these cartridges were charged with gunpowder—do not answer so well as when charged with gun-cotton, because the intense heat of the former burns the cloth, whereas gun-cotton does not even scorch it.

"Breech-loaders must soon supersede arms that load at the muzzle, because by loading at the breech each cartridge is inserted with all the grains of powder effective, but in loading at the muzzle much of the powder becomes non-effective from adhering to the barrel in its passage down, and is in consequence formed into a *wet* paste in ramming home.

"I am, yours, &c.,

"J. Norton.

"Rosherville, 19th April."

ORDISH'S RIGID SUSPENSION BRIDGE.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Your correspondent, "J. W.," remarks that variations of temperature will tend to produce a motion in the supporting points of the straight chains of this bridge to either side of the supported points of the longitudinal girders.

"J. W." appears to have neglected the fact that any alteration of temperature which causes a variation in the length of the chains will also influence the girders to which these chains are attached; and will thus preserve, to an extent sufficient for all practical purposes, "the relative positions of the various parts of the structure."

This question is, however, scarcely worth pursuing, because the elasticity of the metal of the chains, which is brought into action upon the bridge being loaded, necessitates an arrangement which admits of the motion described. This is sometimes accomplished by a link, as suggested by your correspondent, but more effectually by roller frames applied to the cross girder which is suspended from each pair of straight chains, and upon which the longitudinal girders rest.

These arrangements, of course, vary with every particular case; but "J. W." may rest assured that no investigation which has any practical bearing on the subject has been neglected.

I am, Gentlemen,

Yours respectfully,

E. J. W.

18, Great George-street.

LORD MURRAY'S COTTAGE WINDOW FRAMES.

At a recent Meeting of the Royal Scottish Society of Arts, Professor C. Piazzi Smyth described and illustrated an improved cottage window-frame, the invention of the Hon. Lord Murray. The object in view is to provide ventilation without the several inconveniences of either the sash or the hinge principle, so often objected to by many cottagers as entailing much trouble or frequent repairs; and he effects this by making one-fourth of the window slide horizontally, in so simple a manner that, while it allows perfect adjustment in quantity of opening, there is hardly any possibility of the arrangement getting out of order. His Lordship's invention was exhibited to the Meeting in the shape of a wooden model, as well as of a full-sized cast-iron window-frame with sixteen small panes.

SAFETY LAMPS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—It is a common complaint with miners that their lamps do not give sufficient light, and this is sometimes an excuse for their using naked candles or their lamps without the gauze protector. Now I would propose that the cylinders of these lamps should be composed solely of glass, and that only their tops and bottoms should be covered with the usual gauze for the admittance and exit of air. This would of course add much to the light which these lamps now give, and, consequently, increase the comfort of the men; and I am unable to see any objection to the alteration.

I am, Gentlemen, yours, &c.,

J. A. D.

April 8, 1858.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

WARNER, F. *Improvements in ball and other cocks, and valves.* Dated July 21, 1857. (No. 2010.)

The fluid passage has a valve chamber at its outer end, the outlet being below the valve. The upper part of the chamber is closed by a cover. To the under surface of the cover, where the spindle of the valves passes through, is a projection, on which is fixed a flexible cup of leather which enters the upper part of the valve, which is a hollow cylinder closed at bottom and open at top. The lower part of the valves presses on a seat around the outlet passage. The spindle of the valve is fixed to the bottom thereof, and passes through the cover of the valve chamber, where it is acted on by the float lever.

SCOTT, A. *Improvements in stops for gates and doors.* Dated July 21, 1857. (No. 2011.)

Here the stop of a gate or door is arranged to rise and fall as the gate or door is closed or opened, and, at the same time, a bolt is caused to rise and fill the thimble or hole which receives the end of the upright bolt which fastens the gate or door when it is shut, by which the thimble or hole is prevented becoming clogged when the gate or door is open.

NEWTON, W. E. *Improved machinery for manufacturing screws, or screw caps of sheet metal.* (A communication.) Dated July 21, 1857. (No. 2012.)

This consists in making screws of sheet metal, by chasing them up to a screw threaded mandril or chuck, in a particular manner.

HALL, J. *Improvements in the mode of preventing incrustation in boilers.* Dated July 22, 1857. (No. 2015.)

This consists in the application to steam boilers of a vessel for collecting the sediment contained in the water, composed of metal plates one within the other, in which are formed apertures for the passage of water and sediment into the interior of the vessel, such apertures being arranged so that the aperture in the one plate may alternate with the obstructing piece of metal in the next plate, and thus overcome the agitation of the water passing from the boiler before it reaches the interior of the vessel. The plates are united at intervals by metal stays. There is a pipe leading from the interior of the vessel from which the sediment may be discharged.

NEWTON, A. V. *Improved machinery for grinding and polishing stone, glass, and other materials.* (A communication.) Dated July 22, 1857. (No. 2016.)

This relates to imparting an ordinary rotary movement of the polisher around its axis and the rotary movement of the axis around a centre at a suitable distance from that axis, and using in connection with the polisher a reciprocating bed or carriage, and an adjustable guide and gauge frame.

KIRBY, J. *Improvements in hay and other rakes.* Dated July 22, 1857. (No. 2017.)

This consists in combining a cradle or receiver with a rake so as to receive a larger portion of a crop than the rake is capable of holding at one time, and then to deposit it from the cradle or receiver.

DOULTON, H. *Improvements in the manufacture of earthenware drain and other pipes.* July 22, 1857. (No. 2018.)

Here the dies through which the clay is expressed are formed with cutters or parts, so that in making cylindrical pipes they shall be grooved or cut longitudinally, both internally and externally, in an inclined direction to a radial line, so that each pipe may readily be divided into two parts longitudinally. It is preferred to give additional thickness on the sides of the pipe where such inclined grooves are produced.

CLARK, M., and G. BERTRAM. *Improvements in machinery or apparatus for cutting paper.* Dated July 23, 1857. (No. 2021.)

This relates to an apparatus for cutting paper, from the continuous web, as it is brought from the paper-making machine, into lengths of the proper dimensions for sheets of the size required.

DEAKIN, W., and W. PHILLIPS. *Certain improvements in the manufacture of metallic pens and pen-holders.* Dated July 23, 1857. (No. 2022.)

This consists in applying certain tools and motions to an ordinary fly-press, so that thin sheet steel, &c., may be operated on for the manufacture of pens and pen-holders.

VASSEROT, C. F. *An apparatus for moulding candles.* (A communication.) Dated July 23, 1857. (No. 2024.)

The object here is, 1st, moulding candles of any kind by means of a continual thread for the wicks. 2d. Heating the moulds with steam and alternately cooling them by the means of air when the candles are being moulded. 3d. Changing easily the worn out moulds.

HUDSON, W., and C. CATLOW. *Certain improvements in looms for weaving.* Dated July 23, 1857. (No. 2025.)

This has reference to power looms, and

consists, 1, in means of governing the letting off of the warp from the work beam by self-regulating methods of applying drag. 2d. In the application of apparatus for arresting the motion of the loom upon the occurrence of "float." 3d. In a stop rod or protector calculated to relieve the shuttle from a portion of the pressure exerted by the stop rod through the swell, and at the same time to insure the due engagement of the stop rod, tongue, or finger with the frog when the shuttle misses boxing. 4th. In a mode of mounting, arranging, and working rising and falling or drop boxes, whereby they are caused to vibrate along with the sley during the transit of the shuttle, and to remain stationary during the interchange of one shuttle for another, and whereby also one swell is made to serve the exigencies of any number of shuttle boxes.

WILSON, E. *An improved method of consuming smoke.* Dated July 23, 1857. (No. 2026.)

This consists in the introduction of air, steam, or gas or vapour into furnaces by pipes traversing them, the object being, 1st, to cause the air, steam, or gas to become heated to a high degree. 2d. To convey such air, steam, or gas to such parts of the furnace as may be desired. 3d. To secure the minute distribution of the same. The pipes have holes or slits, small in size, but considerable in number, and varying in direction.

NORRIS, C. *Improvements in the manufacture of sulphate of alumina and the application of the same so manufactured in dyeing, printing, paper-making, and such like purposes.* Dated July 23, 1857. (No. 2027.)

The patentee takes china clay, and, after reducing it to a fine powder, takes any convenient number of cwts. of the same, and mixes it with about the same weight of sulphuric acid of specific gravity about 1·750, when at 60° Fah., or thereabouts. This mixture is formed into a heap, and the action of the acid on the clay commences spontaneously, proceeding with violent rapidity until the heap becomes a dry, crude sulphate of alumina, and when cool is fit for use or sale.

NEEDHAM, J. *Improvements in fountain pens.* Dated July 24, 1857. (No. 2028.)

These consist in constructing them so that a supply of ink is maintained in close proximity to the point of the pen, whereby the proper flowing of the ink, while writing, is always ensured, and the entire point of the pen may be immersed in the ink at intervals if required.

BURROWS, J. *Certain improvements in steam engines.* Dated July 24, 1857. (No. 2029.)

This consists in the use of a refrigeratory apparatus to be arranged in connection with the air pump and the condenser for cooling the water used for injection into the condenser after it has passed through the condenser and air pump.

JOHNSON, W. *Improvements in looms for weaving.* Dated July 25, 1857. (No. 2032.)

This consists, 1st, in a mode of forming the shed of the warp in the loom, by which one-half of the healds usually employed are dispensed with. 2d. In an arrangement of parts applied to the shuttle box for holding and releasing the shuttle. This invention cannot be described in detail without engravings.

COLLINS, J. S. *Improvements in reefing and furling of ships' and other vessels' sails, and in the manufacture of the same.* Dated July 25, 1857. (No. 2033.)

This relates to the rigging and gearing of ships to facilitate the taking in of reefs from the deck. It relates also to the strengthening of sails. The application and arrangement of reef pendants, and the seams of the sails being left differently arranged and strengthened to those in ordinary use, are the characteristics of the invention.

SCHÖNEMANN, J. *Improvements in the construction of weighing machines.* (A communication.) Dated July 25, 1857. (No. 2034.)

This consists in a method of guiding the platform of weighing machines, which method is not attended with the usual impediments to the free motion of the platform, the parallel motion of the latter being thereby secured, and, consequently, exact results in weighing obtained. The improved method cannot be clearly described without engravings.

OETZMANN, F., and T. L. PLUMB. *Improvements in upright pianoforte actions.* Dated July 25, 1857. (No. 2035.)

These consist in so constructing the action of an upright pianoforte that the hopper shall take effect directly on the butt of the hammer, and cause it to strike the blow without the intervention of a sticker or rod. A surface is also formed on the hammer butt, which comes in contact with a part of the hopper when the hammer falls off, and so arrests its fall, and forms a check in its tendency to vibratory motion. It also consists in mounting and applying the dampers on the back end of the keys, or it may be to the hopper block attached to the keys, so

that the rise of that end of the key produced by the act of striking a note removes the damper from the string or strings struck by the motion of such key.

WILLIAMSON, W. B. *Improvements in looms employed for weaving textile fabrics and fibrous materials.* Dated July 27, 1857. (No. 2038.)

This consists in a method of constructing looms for weaving textile fabrics and fibrous materials with a self-acting motion apparatus or contrivance for stopping them when any of the warp threads break or slacken.

BROOMAN, R. A. *Improvements in motive power engines.* Dated July 27, 1857. (No. 2040.)

Here, in each of several tubes or cylinders is placed a vane, or a set of vanes, for receiving motion from a fluid in motion, and for communicating the said motion to a central shaft; and these several tubes or cylinders are so combined that water, steam, air, &c., may pass successively through the whole of them, impressing a rotary motion upon each of their central shafts, or upon one common shaft, from which the motion is transferred to a driving shaft, by which any description of machinery may be driven.

SAINTARD, N. *An improved break for railway and other carriages.* Dated July 27, 1857. (No. 2041.)

This consists in mounting wheels or rollers on fixed axes behind or in front of the ordinary carriage wheels, and in arresting the rotation of these wheels by bringing between the additional wheel or roller and the carriage wheels a wedge or a cam fixed upon the additional wheel.

RICHARDSON, B. *An improvement in the manufacture of articles in glass, so as to produce peculiar ornamental effects.* Dated July 27, 1857. (No. 2045.)

Here the workman takes a quantity of glass on to an ordinary pipe or iron, and blows the same into a mould on the inner surface of which are numerous projections in such forms and arranged according to such pattern as may be desired, by which means numerous indents will be produced on the exterior of the glass so blown. The workman then dips the glass into fluid metal, to get the exterior thereof coated with a further surface of glass, or else he places it in a cup of glass blown to receive it, and he then goes on blowing and shaping the glass into the article desired. The several layers of glass in each case may be of different colour.

BOUSFIELD, G. T. *Improvements in apparatus for retarding and stopping carriages on railways.* (A communication.) Dated July 27, 1857. (No. 2046.)

Here the power of the locomotive engine is applied by means of a sliding bar to each carriage, on which there are two stops or projections, one to come into action on an elastic stop or projection on the carriage when the locomotive engine is moving forward, and the other or another elastic stop or projection on the carriage when the engine is moving backward. The ends of these sliding bars are arranged to be readily connected with each other, in order that the several sliding bars of the carriages composing a train may act as one bar. By these means the breaks are applied as soon as the speed of the engine is beneath that of the carriages.

CLARK, W. S. *Improvements in automatic feeding printing presses.* (A communication.) Dated July 28, 1857. (No. 2050.)

This consists in feeding printing presses from continuous sheets of paper by continuous motion, which sheets may be severed into sheets of any desired size, either before or after receiving their impression. Also, in setting type in separate and independent columns; notching and grooving type so as to receive keys; and keying type to their forms by their keys or fusing. It cannot be described without engravings.

HALLEN, E. *Improvements in the construction of bedsteads and similar articles to recline or sit on.* Dated July 28, 1857. (No. 2051.)

This invention cannot be fully described without engravings.

SMITH, O. H. *An improvement in supplying steam to water to heat the same, and in preventing what is technically called priming of steam.* Dated July 28, 1857. (No. 2052.)

Heretofore, in supplying steam to water in order to heat it, much noise and vibration have been produced, and the object here is the prevention of the same. In place of permitting the steam passing from a supply pipe to come directly in contact with the water heated thereby, the outlets are surrounded by a quantity of matter, so as to produce an infinite number of interstices, and it is preferred to use a large quantity of small pieces of metal, pebbles, &c., through which the steam passes before getting to the water. And in preventing steam priming, the steam chest is divided from the boiler by a perforated plate of woven wire, and on such partition is placed a quantity of pebbles, &c., through which the steam passes.

HIRST, W. *Improvements in manufacturing felted fabrics.* Dated July 28, 1857. (No. 2053.)

By the following process the patentee makes fine cloths equal in beauty and superior in wear to the finest cloth now worn,

A suitable accumulation of silver having been produced, the same is spread on a stout wrapper of open or gauze weaving, and of somewhat greater width and length than the silver. The silver and wrapper are wound tightly on a roller of about ten inches diameter, arranged to revolve in a trough containing hot water and soap. A bar, parallel with the axis of the roller, is moved in an up and down motion, and the roller turns a small distance at each stroke, so that the bar beats a fresh place at every movement. This operation is repeated on a smaller roller with soap and water, and afterwards in a dry state.

BOUSFIELD, G. T. *Improvements in apparatus for feeding water to steam boilers.* (A communication.) Dated July 28, 1857. (No. 2054.)

This consists in two close chambers, which are connected with each other, with the drain pipe of the steam heating apparatus or radiators, and with the boiler, by a system of pipes and valves, so that the chambers act alternately to receive the condensed water from the steam heating apparatus or radiators, and to feed it to the boiler in a continuous stream. It also consists in combining the said feeding apparatus with a steam heating apparatus situated lower than the level of the boiler, so that the hot water (which, from the want of a pump to raise it, would otherwise be allowed to run to waste) is raised and returned to the boiler.

JACKSON, R. *Improvements in protecting certain parts of the body from disfigurement by cutaneous diseases.* Dated July 28, 1857. (No. 2056.)

To prevent the permanent marks of disease from being left on the face, a hood or helmet, made of a soft air-proof material, envelopes the whole of the head, face, and front part of the neck, and it is made to fit closely round the back of the neck and under the chin by means of an elastic band. A tube of vulcanised india-rubber, having a wire passed through it so as to retain its shape when bent, is made to fit closely round the nostrils and mouth. The moulded tube is sewn to the face part of the hood, and apertures are made in the fabric, so that the functions of the nose and mouth may not be impeded.

BAXTER, E. W. *An improved mode of preparing glass labels, advertising tablets, and ornamental devices upon glass.* Dated July 28, 1857. (No. 2058.)

This consists in producing upon surfaces of glass, through the chemical action of light, copies of plain or ornamental writings and ornamental designs in gold and other metals, and in pigments or colours.

DORTET, J., and A. B. DENIS. *An improved safety padlock.* Dated July 28, 1857. (No. 2059.)

This is intended chiefly for the use of the Post-office in securing mail bags, but can be used as a safety padlock. The body of the lock consists of a box holding a spring catch and a hinged plate carrying two raised projections, which, when closed, form, with the top of the box, a continuous circular rim. This plate, on being pressed down, is kept in position by a spring catch, and is intended to receive a seal within the rim; the hasps or bolts of the lock fixed upon a metal plate, connected by chains to an address plate for post-office purposes, and then to the body of the lock direct, are passed into the lock and moved sideways, when the spring catch will become engaged and so fixed in the bolt plate that the lock cannot be opened or the spring catch forced back without the seal being broken. To open the lock, a pointed instrument is introduced into an aperture or hole in the top of the lock, and pulled back, whereby the spring catch is withdrawn, the seal broken, and the lock thereby opened.

BOBŒUF, P. A. F. *Improvements in preserving and otherwise treating animal and vegetable substances, and in the purification of oils employed therein, and which may be used for other purposes.* Dated July 28, 1857. (No. 2060.)

The object here is, 1st, the preservation, the concretion, the hardening, and the colouring in various shades of inert animal substances (or substances of animal origin), the embalming of bodies, the treatment of skins, and the colouring of silk, wool, leather, bone, ivory, feathers, &c. 2d. The destruction of insects, such as ants, fleas, bugs, &c., and the preservation of animal and vegetable life from insects; the curing of disease in vegetable life generated or produced by or from insects or animalculæ, such as oidium, potato disease, &c., the preservation of substances from destructive insects, the preservation of wood and of ships, the purification of all crowded habitations and places, such as hospitals, schools, barracks, &c. The patentee employs for the above purposes vegetable and mineral oils, containing saponifiable acid oils, capable of forming soluble salts in water, and of acids derived by substitution obtained from saponifiable acids contained in essential vegetable or mineral oils. The invention includes the purification of vegetable and mineral essential oils containing saponifiable oils without distillation by separation.

CLAY, J. *An improvement or improvements in saddles.* Dated July 28, 1857. (No. 2062.)

The patentee gives elasticity to the seats of saddles by means of helical or coiled springs, applied so as to keep the webs or other material constituting the foundation of the seat in a state of tension.

BETHELL, J. *Improvements in the construction of ships and other vessels.* Dated July 28, 1857. (No. 2063.)

This consists in building ships of a combination of iron ribs and wooden planks, fixed together by metal bolts and screws, and further cemented together by a composition or glue. Also in connecting the decks of ships, or the main timbers supporting the decks, to and with the keel by means of lattice or other framing, whereby considerable stiffness and strength are obtained.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

MOHR, J. *Improved machinery for propelling vessels.* Dated July 21, 1857. (No. 2013.)

This consists in causing a column of water, in rapid motion, to act upon the stationary water in which the vessel floats. The machinery consists principally of a turbine.

ARMSTRONG, W. G. *Improvements in the mode of adjusting ordnance for fire by night or day.* Dated July 22, 1857. (No. 2014.)

Here an instrument in the nature of a quadrant is applied to the gun, for indicating its angle of elevation in reference to the horizontal plane, after the proper elevation has been determined in daylight. This instrument is afterwards re-applied for adjusting the gun to the same elevation when the object cannot be seen. There is also applied an arrangement of sights, with or without a reflector, and a graduated arc for determining in daylight the lateral angle which the gun, when properly directed, forms with some mark at which a light can be fixed at night. By varying the horizontal direction of the gun until this light can be sighted by the instrument, the proper lateral adjustment for striking the required object can be determined when that object becomes invisible.

M'KAY, M., and L. ROSE. *Improvements in apparatus to be used in washing and scouring household linen and other textile fabrics.* Dated July 22, 1857. (No. 2019.)

This consists in the employment of a board, having attached to one of its sides a lever supporting a scouring brush, and so contrived that both lever and brush can be moved over the surface of the board. This apparatus is placed in the washing tub, and the article to be cleansed is brought over the face of the board, and operated upon by the brush and lever.

KING, J. *Improvements in the preparation of peat and peat coke or charcoal and in machinery or apparatus for that purpose.* (A communication.) Dated July 23, 1857. (No. 2020.)

This abandoned invention requires more space for its detailed description than we can afford it.

WILLIAMS, T. *An improvement in the construction of ships or vessels, whereby their draught may be regulated.* Dated July 24, 1857. (No. 2030.)

The object here is to improve the form of vessels with the view of rendering them available for navigating deep or shallow waters. It consists in forming within the hull of the vessel one or more water-tight compartments, arranged longitudinally in the line of motion of the vessel, so as to enclose an inner case for containing a portion of the cargo, the said case being raised or lowered for regulating the draught to the depth of the water, by means of pneumatic apparatus.

BENNETT, J. *Improvements in boring tools for wheels, shafts, and like purposes.* Dated July 25, 1857. (No. 2031.)

The inventor forms an archimedian screw augur, with a hole longitudinally through it for passing the rods, and then connects it by a key or rod at bottom, whereby the same is set in motion by the revolving of the rods.

GEDGE, J. *Improvements in doubling machines.* (A communication.) Dated July 27, 1857. (No. 2036.)

The inventor proposes to make "a transversal doubling machine," to be put in motion by hand or other power, by placing on a framing the necessary parts.

WILLIAMS, W. *Improved graving slips for the repairing of ships.* Dated July 27, 1857. (No. 2037.)

Here it is intended to commence the slip at a sufficient depth of water to allow the vessel to be placed on the intended cradle. The cradle is principally of wrought iron, with ribs on each side, to be raised up nearly perpendicular to the height of the deck of the average of vessels. These ribs are to have regulating screws, to be moved to any height required, for accurately fixing the vessel on the centre of the cradle. The cradle, with the vessel thus secured, is to be drawn up to the top of the machine, which is now to be a lifting bridge, secured by a hinge joint at the top end, and the bottom end to be lifted when required by hydraulic pressure, so as to bring the

bottom end on a level with the other. Thus the vessel and cradle are placed on level ground, and may be drawn to any distance required.

FRIEND, J. W. *An improved meter for registering the flow of water and other liquids.* Dated July 27, 1857. (No. 2039.)

This consists of an apparatus (attached to the main supply pipe, or otherwise, through which the liquid flows), of cylindrical form, provided with an outer case enclosing the works. The water, &c., is directed against the blades of a fan or paddlewheel, through slot openings formed eccentrically in the channel in which the wheel revolves, the said wheel being actuated, and motion imparted therefrom to a graduated dial plate through the intervention of screw, wheel, and toothed pinion gear.

MORTERA, A. *Improvements in coupling carriages on railways.* Dated July 27, 1857. (No. 2042.)

This consists in fitting in the end of one carriage between the two ordinary buffers a supplementary buffer-head, and in the end of another a hinged spring catch, which enters the buffer-head, and is maintained there by a latch, a spring, or a key. The whole of the carriages for a train can be coupled without the aid of attendants; and in order to uncouple them the latch has to be raised, or the key removed.

RIDSDALE, J. *An improvement in ships' scuttles.* Dated July 27, 1857. (No. 2043.)

This consists in forming the frames of scuttles hollow, and in making one, two, or more apertures externally therein, which lead into one or more apertures opening internally. The internal apertures are all furnished with a valve or stopper for closing them when requisite. The object is the admission of air without the liability of water entering with it.

ANDERSON, F. W. *A mechanical slow-match for submarine or other blasting and mining operations.* Dated July 27, 1857. (No. 2044.)

This consists in constructing a slow match, composed of a train or trains of wheels, so combined and put into motion (by springs or otherwise), and regulated as to discharge the blasting powder at any given time by means of percussion caps or other suitable fire producing agent.

BENNETT, J. H. *Improvements in engines to be worked by atmospheric pressure or steam, or by both in combination, and also in steam generators to be used therewith.* Dated July 27, 1857. (No. 2047.)

This invention cannot be clearly described without engravings.

DANVERS, P., and G. W. BILLINGS. *An improved means for rolling hoops and wheel tyres.* Dated July 27, 1857. (No. 2048.)

The iron to form the hoop or tyre is bent up as usual, and welded together at the ends. It is then placed, while in a heated state, between a pair of rollers with grooved surfaces. The rollers are opened to receive the hoop or tyre, forced together to roll the same by screws, &c., are connected to each other and driven by suitable gearing. Above the said rollers there is a horizontal slide, fitted so as to be adjusted vertically, until it stands at the line of the diameter of the hoop or tyre. On this slide two rollers are applied in sliding blocks, so that a screw fitted in the slide with right and left-handed threads upon it shall project or retract the rollers to the diameter of the hoop or tyre; and these rollers, which gauge the diameter in connexion with the before-mentioned compressing rollers, form the tyre or hoop round, and of the correct size and shape.

HIGGIN, J. *An improved method of drying garancine or other moist substances.* Dated July 28, 1857. (No. 2049.)

The inventor spreads the garancine, &c., on a series of circular trays, arranged one above another in a heated chamber. Through the centre of these trays passes a vertical shaft, on which are keyed arms. These arms are provided with teeth. The shaft is made to revolve, and the teeth stir up the moist substance, whereby fresh surfaces are constantly exposed to the air, and a rapid drying is effected. There are other arrangements included in this invention.

BRUNOT, P. *Improvements in springs for petticoats and other articles of dress.* Dated July 28, 1857. (No. 2055.)

These springs are composed of one, two, or more strips of cane, covered with hemp, flax, or other fibre. The several strips of cane are connected together edge to edge, by means of size or glue, which renders them flat. They are then covered with cotton, &c., by a braiding or covering machine.

PROCTOR, W. *Improvements in the manufacture of sulphuric acid.* Dated July 28, 1857. (No. 2057.)

The inventor employs jets of steam for drawing into the acid chambers currents of atmospheric air. The air may be drawn direct from the atmosphere, and, passing through a pipe contained in, or surrounding the steam pipe, will be heated by the high pressure steam, and thus presented at a favourable temperature for entering into chemical combination with the contents of the chamber.

TILL, T., and W. GARDINER. *An improvement or improvements in preventing collisions on railways.* Dated July 28, 1857. (No. 2061.)

The inventors place a series of levers along the line of railway, at suitable distances apart. There levers are connected together alternately by wire or otherwise; that is to say, the first is connected with the third, the second with the fourth, and so on. When a locomotive, &c., passes over one of the levers it moves the said lever into, and leaves it in such a position that a locomotive, &c., is stopped thereby on coming to that part of the line. But when the first locomotive, &c., has arrived at the third lever, in raising the said third lever it causes the first lever, connected with the third, to be depressed, so that a locomotive may pass the first lever without interruption.

SIEMENS, C. W. *Improvements in refrigerating and producing ice, and in apparatus or machinery for that purpose.* Dated July 29, 1857. (No. 2064.)

This relates to freezing and refrigerating by the expansion of air or elastic fluids. The air is first compressed by a cylinder or pump, by which its temperature is raised, and it is cooled while in the compressed state, and it is then allowed to expand in a cylinder, by which its temperature is lowered. The air thus cooled is brought in contact with the articles to be cooled or frozen, and is then conducted through an interchanger or apparatus, by which it is made to cool the compressed air, which enters the interchanger in the opposite direction.

BERTWISTLE, J. and D. *Improvements in ventilating.* Dated July 29, 1857. (No. 2065.)

This is particularly applicable to ventilating rooms, but may be applied to churches, ships, sheds, &c. The inventors prefer to admit the fresh air through a suitably perforated window sill, or somewhere near the floor, and to allow the vitiated air to escape through a perforated plate near the ceiling. The openings for the ingress and egress of air may be partially closed by wire gauze or other means, and dampers and shutters are applied to close the opening when required. It also consists in a self-acting damper applied to the upper or lower opening, and acted upon by the current of air through the lower opening, or *vice versâ*, to regulate the current of air.

PROVISIONAL PROTECTIONS.

Dated February 16, 1858.

298. John Coutts, of Willington, Newcastle-on-Tyne, naval architect. An improved paint, pigment, or composition, more particularly adapted for coating the hulls of ships, either iron or wooden, so as to prevent damp, corrosion, or fouling, and apparatus for drying and warming surfaces, and preparing and applying to the same such paint, pigment, or composition.

Dated March 24, 1858.

617. Constantine Nicolaus Kottula, of Liverpool, soap manufacturer. Improvements in purifying soda leys, whereby they are rendered capable of saponifying all fatty matters or resins used in the manufacture of soap.

618. Constantine Nicolaus Kottula, of Liverpool, soap manufacturer. Improvements in the manufacture of compact neutral soap.

Dated April 3, 1858.

704. Antonio Pelez, of Mortimer-street, Cavendish-square. A new apparatus for deepening rivers, and rendering them navigable. A communication.

714. Eliezer Edwards, of Birmingham, manufacturer. An improvement or improvements in the manufacture of glass finger-plates for doors and other articles of like manufacture.

Dated April 5, 1858.

720. William Stettinius Clark, of Upper Park-place, Dorset-square. Improvements in grain and grass harvesting machines, and in the automatic delivery thereof of cut grain. A communication.

722. John Smith, of Oldham, manufacturer. Improvements in the manufacture of pile fabrics.

724. Samuel Fox, of Stocksbridge Works, Deepcar, York, umbrella manufacturer, and James Chesterman, of Sheffield, manufacturer. Improvements in stays or corsets, and in the manufacture of steel employed therein, and applicable to other articles of dress.

Dated April 6, 1858.

726. Louis Tétar Van Elven, of Clapham-road, engineer. Improvements in apparatuses for raising and lowering weights and bodies.

728. Henry Wetherell and George Gray, of Upper Chapman-street, zinc workers. An apparatus for preventing down draughts and currents in chimneys, flues, and shafts.

730. John Camp, of John-street, Clerkenwell, bookbinder. An improved construction of expanding portfolio.

732. Charles Henry Chadburn, of Liverpool, optician. Improvements in pressure gauges.

734. Jules Erckmann, of Paris, civil engineer. Improvements in galvanic batteries.

736. Bernard Blanché, of Bordeaux, merchant. Using Malacca and Manilla cane instead of whalebone.

738. John Rose, of Glasgow, gentleman. Apparatus for applying heat, cold, moisture, fumes, vapors, and other agents in medicine and surgery. A communication.

Dated April 7, 1858.

741. Anthony and Louis Casartelli, of Liverpool, opticians. Improvements in pressure and vacuum gauges.

743. William Armand Gilbee, of South-street, Finsbury. An improved machine for corking bottles. A communication.

744. James Wright, of Alfred-place, Newington-causeway. Improvements in the mode of treating leather in order to render it waterproof. A communication.

745. William Armitage and Henry Lea, both of Farnley, near Leeds. Certain improvements in the manufacture of iron.

746. Richard Worthy, of Albert-street, Regent's Park. An apparatus for preparing medical fomentations.

747. George Williams Baker, of Park Farm, Woburn, Bedford, farm steward. Improved signal apparatus to be applied to railways.

748. William Nimmo, of Manchester, cotton-spinner. Improvements in the manufacture of printed woven fabrics.

750. James Doherty, of Edinburgh, foreman tailor. Improvements in buttons or dress fastenings.

751. Charles Frederick Whitworth, of Sheffield, engineer. Improvements in signal apparatus for railways.

Dated April 8, 1858.

754. John Cartwright, of Shrewsbury, agricultural implement maker. Improved apparatus for transmitting motive power for driving machinery.

755. George Davies, of Serle-street, Lincoln's-inn. Improvements in the manufacture of wads for ordnance. A communication from H. Marini, of Paris.

756. George Edward Taylor, of Oatlands, Leeds. Improvements in machinery for raising the pile of cloths.

757. George Rowland, of Brussels. Improvements in the manufacture of artificial whalebone.

758. Frederick William Mowbray, of Bradford, York, engineer, and James Broadley, of Saltaire, same county, overlooker. Improvements in means or apparatus employed in weaving.

759. William Clark, of Chancery-lane. A burner for candles. A communication.

760. Thomas Greenwood, John Batley, and Jacob Dockray, of Leeds, machine makers. Improvements in machinery for carding, opening, straightening, and preparing to be spun, tow and other fibrous materials.

761. Thomas Roberts and John Dale, of Manchester, manufacturing chemists. Improvements in the production of a substitute for oil used with pigments, and in the preparation of pigments suitable thereto.

Dated April 9, 1858.

763. Wilson Ager, of Rohrsburg, United States. An improvement in rice-cleaning machinery.

765. William Robinson Jackson, of Baltimore, United States. A self-acting railway break.

767. Henry Bayley, of Staley Bridge, Lancaster, cotton manufacturer, and John Greaves, of the same place, manager. Improvements applicable to certain machines for spinning and doubling fibrous substances.

769. The Honourable William Talbot, of the Army and Navy Club, Pall-mall. Improvements in means or apparatus to facilitate the lowering and detaching of boats from ships or vessels, which improvements are also applicable to lowering and disengaging other bodies.

Dated April 10, 1858.

771. Rowland Mason Ordish, of Great George-street, Westminster. Improvements in suspension bridges and suspended girder bridges.

773. Germain Guyot, of Denain, France, foreman in the iron foundry. Welding broken cast iron pieces.

775. Pierre Brun, of St. Honoré, Paris. The application of an improved blowing fan to steady or portable forges, with or without reverberatory furnaces, as well as to ventilation in general. A communication from F. Maniguet, of Lyons.

777. Spencer Thomas Parmelee, of Edinburgh. The manufacture of improved belting for machinery or other purposes.

779. William George Armstrong, of Newcastle-upon-Tyne, civil engineer. Improvements in the means of firing or igniting explosive projectiles.

781. Daniel McCrae, of Greenock, grease manufacturer. Improvements in preserving ships' bottoms and other exposed surfaces from fouling and injury or decay.

783. Alexandre Manbré, of Rathbone-place, Oxford-street. The manufacture of a colouring matter for colouring spirits, beverages, and other liquids from the sugar of potatoes, known as glucose and syrup "de fecule."

785. Amable Cyprien Thibault, of Paris, painter. Improvements in the manufacture of paper-hangings, and in the machinery employed therein.

Dated April 12, 1858.

787. Samuel Bickerton, of Oldham. A thermo-pneumatic lubricator for oiling shafts, axles, machinery, &c.

789. Thomas Kay, of Oxenhope, near Keighley, manager. An improved method of producing or obtaining heat suitable for the singeing of yarns and textile fabrics, which heat is also applicable to other heating purposes.

791. Pierre Ratel, of Paris, gilder on metals. A new or improved machine for depositing grain and manure.

Dated April 13, 1858.

793. Thomas Spiller, Esq., of Red Lion-square. Exhibiting slides in the stereoscope, and preserving them from injury, to enable each slide to be conveyed to the point of view, and then after use deposit them each in its place in the box without handling or exposing the slides to the chance of being soiled, keeping them always under cover in safety; a box 18 in. by 8 in. square will hold and exhibit nearly 1,000 slides.

795. Thomas Taylorson Jopling, of Bishopwearmouth, ironfounder. Improvements in water-closets.

797. Philipp Schäfer and Frederick Schäfer, of Brewer-street, manufacturers of travelling bags. Improvements in fastenings for travelling bags, portmanteaus, and other like articles.

799. Thomas Blake Ayshford, of Britannia-road, Fulham. Certain improvements in the construction of carriages called omnibuses.

PATENTS APPLIED FOR WITH COMPLETE SPECIFICATIONS.

841. Marc Antoine François Mennons, of Paris. A certain medicinal compound for the treatment of epilepsy. A communication. Dated 17th April, 1858.

842. Marc Antoine François Mennons, of Paris. An improved system of portable tents for military and other purposes. A communication. Dated 17th April, 1858.

843. Marc Antoine François Mennons, of Paris. An improved substitute for the pulverised cotton and wool employed in the manufacture of felted tissues, papers, and other fabrics. A communication. Dated 17th April, 1858.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," April 27, 1858.*)

3075. J. Hogg, jun. An improvement in the manufacture of copying paper.

3087. J. G. Gibson and S. Berrisford. Improvements in looms for weaving, parts of which improvements are applicable to lubricating bearings generally.

3093. J. H. Dickson. Improvements in machinery or apparatus for scutching and heckling flax, hemp, and other similar fibrous materials.

3094. J. J. Cregeen. Improvements in the treatment of India and China grass, pine-apple hemp, flax, and other similar fibrous materials, and in the machinery or apparatus employed therein.

3116. A. Lees and J. Clegg. Certain improvements in looms for weaving.

3120. R. A. Brooman. Improvements in signalling, in order to prevent collisions between trains upon railways. A communication.

3121. R. A. Brooman. Improvements in lime-kilns, and in apparatus for working the same. A communication.

3127. W. Thrift and A. High. An improved self-acting ship's water-closet.

3133. W. H. Myers. An improved coffee-pot made of metal or earthenware to contain coffee and milk or cream separately, the same being used as a chocolate pot, the same invention being applicable to tea-pots for the same purposes, made either in metal or earthenware, the same invention being applicable to table urns, and the same invention being applicable to jugs made either in earthenware, or glass, or metal, to contain spirits and water, or other liquids in different compartments.

3134. J. Tatlow and H. Hodgkinson. Improvements in railway breaks, and in apparatuses for connecting shafts or rods for working breaks and signals.

3138. R. F. Sturges. A new or improved manufacture of rollers or cylinders for printing fabrics.

3142. M. Landou. Improvements in cooking utensils.

3149. C. N. Nixon. Improvements in attaching, fitting, and securing the rudders of ships, barges, boats, and every other description of sailing or steam vessel.

3154. A. W. Williamson. Improvements in treating scammony root and commercial scammony, to obtain the active principle therefrom.

3159. G. Croft and S. D. Steel. Improvements in machinery or apparatus for combing and preparing wool and other fibrous substances.

3198. G. Wilson. Improvements in the furnaces or fire-places of steam boilers. A communication.

156. J. H. Johnson. Improvements in the manufacture of metal pipes, and in the apparatus employed therein. A communication.

255. L. Cass. Improvements in steam engines and steam engine boilers, and in apparatus connected therewith. A communication.

438. C. Boyce. A new or improved anchor.

497. J. Worrall and C. Race. Improvements in machinery or apparatus for stretching and drying fabrics, part or parts of which said apparatus are also applicable to other machines wherein fabrics are required to be distended.

651. B. Burrows. Improvements in weaving webs or narrow goods, and in ornamenting elastic webs.

678. W. Oldfield and T. O. Dixon. Improvements in gas burners.

679. F. A. Gatty. Improvements in treating certain compounds containing the colouring matter of madder.

692. A. Pelez. Improvements in hydraulic machines. A communication.

693. E. A. Colette. Hashing meat with a mechanical chopping board.

705. V. Gâche, ainé. An improvement in the construction of steam engines for the use of vessels.

708. J. H. Johnson. Improvements in ships' propellers. A communication.

731. R. Hornsby, jun. Improvements in ploughs.

733. H. Schwietzer, J. Holder, and J. Broughton. Concentrating and retaining the valuable properties of farm-yard and stable manure.

751. C. F. Whitworth. Improvements in signal apparatus for railways.

754. J. Cartwright. Improved apparatus for transmitting motive power for driving machinery.

758. F. W. Mowbray. Improvements in means or apparatus employed in weaving.

760. T. Greenwood, J. Batley, and J. Dockray. Improvements in machinery for carding, opening, straightening, and preparing to be spun, tow and other fibrous materials.

781. D. McCrae. Improvements in preserving ships' bottoms and other exposed surfaces from fouling and injury or decay.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

880. Hypolite Macé.
886. Richard Bright.
892. William Hadfield.
903. Joseph Whitworth.
913. James and George Hunter.
916. Matthew Andrew Muir.
921. Louis Alexandre Avisse.
923. James Wallace, jun.
946. William Shears.
1071. John Herdman.

LIST OF SEALED PATENTS.

Sealed April 23d, 1858.

2703. Robert Harrild and Horton Harrild.
2707. John Macintosh.
2708. James Thom and Hugh McNaught.
2711. James Fairclough, John Fairclough, and Joseph Cowan.
2716. James Ferrabee and Charles Whitmore.
2718. William Clarke.
2721. James Newall.
2726. Henry John Daniell.
2730. Pierre Adolphe Melchior Maury.
2733. George Shillibeer and George Giles.
2734. Joseph Sloper.
2740. John Child and Joseph Child.
2743. Robert Alexander Ronald.
2765. George Bell Galloway.
2768. Thomas Lowe.
2794. Anthony Charles Sacré.
2801. Romain Ignace Charles Dubus.
2811. John James Cousins.
2850. Albert John Davis.
2855. Stanley Webster.
2879. John Gedge.
2887. Edward Daniel Johnson.
2933. Alfred Vincent Newton.
2937. Joseph Schloss.
2968. Frederic Groom Grice.
2988. John Summers and David Wormald.
2997. John Livesey.
3042. Thomas William Willett.
147. Arthur Bird.
245. Richard Carte.

294. William Armitage.
301. George Baker and John Edward Baker.
329. William Thomson.
350. William Johnston.
422. George John Parson and Thomas Pilgrim.

Sealed April 27th, 1858.

2727. John Addison.
2741. Henry Taylor.
2744. William Greening.
2746. Daniel de la Cherois Gourley.
2748. Thomas Cook.
2752. Ephraim Smith.
2759. William Harwood.
2763. Samuel Knowles.
2774. Peter Gabbitass.
2785. James Apperly and William Clissold.
181. James Childs.
359. Sydney Smith.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICE TO CORRESPONDENTS.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

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Mechanics' Magazine.

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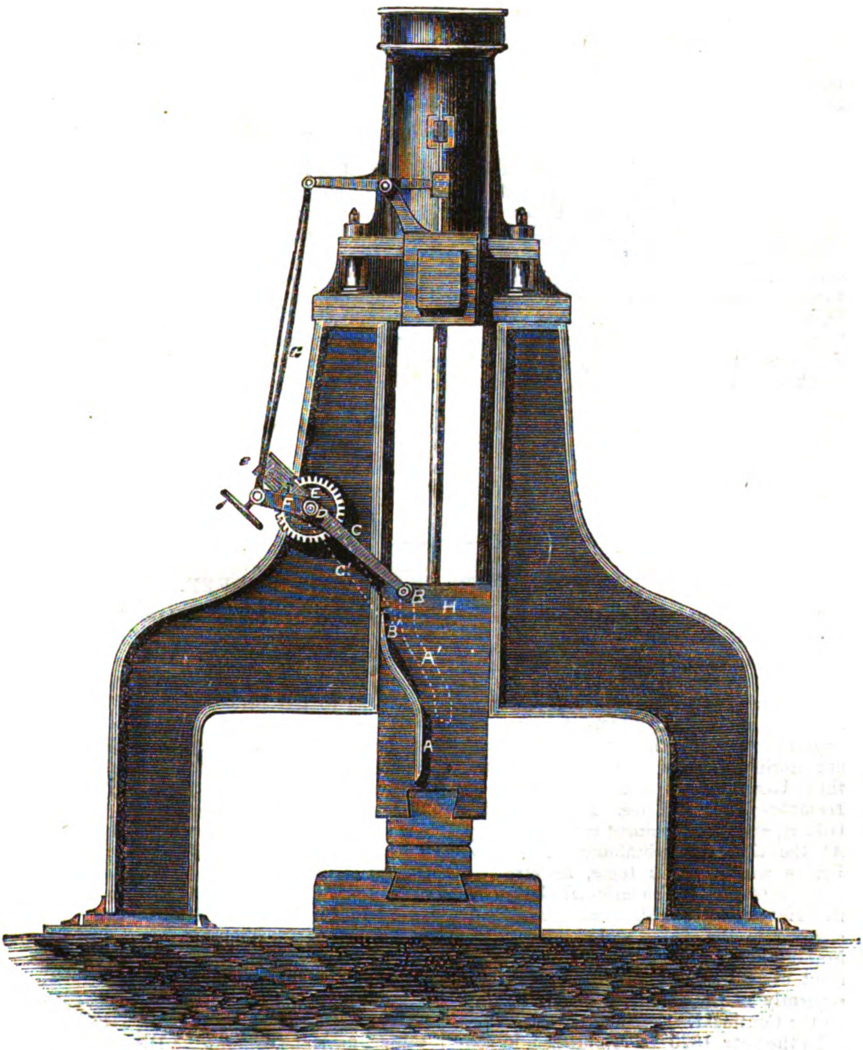
Edited by R. A. Brooman and E. J. Reed, 166, Fleet street, London.

EASTWOOD'S PATENT DIRECT SELF-ACTING MOTION FOR STEAM-HAMMERS.



EASTWOOD'S PATENT DIRECT SELF-ACTING MOTION FOR STEAM HAMMERS.

Mr. James Eastwood, Engineer, of Derby, has patented a very useful improvement in working the valves of steam hammers, which consists in the employment of the following contrivances, thus:—He places two tripper slides on the hammer-block of an ordinary steam-hammer, one on the front side, and the other on the back. One of these slides is to open the valve and admit steam to raise the hammer, and the other on the opposite side is to shut the valve and allow the hammer to descend. On the hammer rising, the slide comes in contact with a roller on the end of a lever working on a cross shaft, the other end of which lever is attached to a worm wheel. On this shaft there is a lever or crank which is connected to the valve spindle by a suitable rod, the action of which closes the valve and causes the hammer to descend. The slide on the opposite side of the hammer coming in contact with another roller on the end of a similar lever opens the valve again to admit steam to raise the hammer, and brings the other roller and lever forward to be acted upon on the return stroke, to cause the hammer to drop. The height and fall of the hammer are regulated by moving the levers which act on the worm wheels, so that the roller ends will come sooner or later in contact with the slides on the hammer block to open or close the valve.

The manner in which the invention is carried into effect is illustrated in the engraving on the preceding page, which is a front elevation of an ordinary steam-hammer fitted with the improvement. A, A', are the tripper slides upon the hammer-block, H. B, B', are rollers carried respectively by the ends of the levers, C, C', which work upon the cross shaft, D. On the hammer rising, the slide, A, on the front side of the hammer-block, comes in contact with the roller, B, and thereby raises the lever, C. The shaft, D, is thus turned round, carrying with it the crank arm, F, to which is jointed the connecting rod, G, which thus closes the valve and shuts off the steam. On the hammer descending in the usual manner, the slide, A', on the back of the hammer, comes in contact with the roller, B', on the lever, C', and, by turning the shaft, D, in the opposite direction, raises the crank arm, F, and the connecting rod, G, and thus opens the valve. On the hammer again rising, the steam will be shut off, as before. The upper ends of the levers, C and C', have attached to them worms, in gear with the worm wheels, E, E', which are made fast on the cross shaft, D. By turning the worms, the positions of the other ends of the levers, C, C', may be varied in order to cause the slides to take effect sooner or later upon the rollers, B, B', for the purpose of obtaining shorter or longer strokes.

THE LATE MR. JOHN SEAWARD, ENGINEER.

We cannot allow the death of the above-named gentleman, which took place on Friday, the 26th March last, to pass without record or observation in our pages. He was educated as an Architect and Surveyor, and early distinguished himself by various papers on scientific subjects connected with engineering, chemistry, &c.; and he was thus brought into connection with Sir Humphrey Davy, Thos. Telford, Davies Gilbert, and other eminent men of the day. At the time the rebuilding of London Bridge was a public topic, he attracted much attention by an original design for it. He soon afterwards became extensively engaged in the design and construction of iron bridges and docks; also in the development of lead mining in Wales; and subsequently in the extension of gas lighting on the Continent.

In the year 1825 he established, in conjunction with his brother, the late Samuel Seaward, the large manufactory for steam engines at Limehouse, known as the "Canal Iron Works," at which an immense number of engines, up to the largest size, have been produced to the present time. Mr. Seaward's modifications of the Marine Engine are numerous; but the most important will, undoubtedly, be considered his celebrated design for superseding the heavy Beam Engine (as left by Watt, and up to that time the only kind used in large ships) by a plan of "Direct Acting" Engine, known as the "Gorgon" Engine; and, in consequence, he soon became extensively engaged in the design and construction of numerous engines on his plan for the British Navy and other services. Amongst other of his improvements in the detail of the steam engine are, an Improved Paddle-Wheel for swift steamers; the Telescopic Funnel for ships of war; the Disconnecting Crank; the Hydraulic Lifting Apparatus

for the propeller; the Cheese Coupling for disconnecting ditto; the Marine Tubular Boiler; &c., &c.

In private life he was singularly unostentatious; and his acquirements were solid and extensive on numerous subjects unconnected with his profession. He was the especial friend of the suffering and the poor; and to them his purse and sympathy were ever accessible.

We understand that through his decease those old established premises, the "Canal Iron Works," with the whole of the plant, &c., are being offered for disposal on very favourable terms; and we should hope, for the sake of engineering in London, that premises possessing a site and other advantages so superior will not long be permitted to remain unemployed.

THE CORT CASE.

We are happy to be able to announce that Lord Derby, to whom the Cort case has been submitted, has resolved at once to relieve the three daughters of the late Henry Cort with a grant of 200*l.* from the Royal Bounty Fund, and proposes, we believe, to take further steps towards doing justice in this matter.

The following letter, from the Treasury, communicated the gratifying fact to the Cort family:—

"Whitehall, April 22d, 1858.

"Sir,—I am commanded by the Lords Commissioners of Her Majesty's Treasury, to acquaint you that the Paymaster-General has been authorised to pay to the daughters of the late Mr. Henry Cort, on their applying to him, the sum of 200*l.*, as of Her Majesty's Royal Bounty.

"I am, Sir, your obedient servant,

"C. C. Trevelyan."

This step reflects great credit upon Lord Derby and upon his son Lord Stanley, by whom the case has been warmly supported; nor is Mr. Disraeli undeserving of public approbation for the manner in which he has lent it his countenance and aid.

Earl Derby is certainly the first Prime Minister, not only of recent date, but for nearly half-a century, who has condescended to manifest the slightest consideration for the three surviving daughters of the late Henry Cort, the money value of whose inventions to the British nation has been attested by twenty-five of the most eminent authorities, and made known to his Lordship, to be not less than *six hundred millions sterling.*

Lord Palmerston, also, early in 1856, long before his Lordship was made acquainted with the money value of Henry Cort's inventions, obtained for the only surviving son a grant of 60*l.*; and after the *Times* had published on the 29th July, 1856, a powerful leader founded on the facts contained in two Petitions presented by Mr. Roebuck to the House of Commons—one by Mr. Richard Cort, on behalf of himself and sisters, and the other by more than fifty individuals, including the most eminent authorities, praying for some more adequate consideration for the unexampled services of the late Henry Cort—Lord Palmerston required the Directors of the Museum of Practical Geology to report generally on his inventions. But, instead of reporting on the whole of the merits, the Report was confined to the last invention, patented by Henry Cort, in 1784, of puddling alone, omitting altogether two more important inventions of balling and piling, and rolling, patented in 1783, without which the invention of puddling could have been of no value to the British nation.

Had Earl Derby been told that neither his Lordship, nor Lord Palmerston, nor any advocate since of its merits, would have known anything of the case but for the exertions of Mr. Richard Cort, who had at his own personal risk and expense given publicity to the whole of the facts, and is now struggling, with a pension of 50*l.* per annum, to pay debts amounting to more than the whole of this stipend, his Lordship would, no doubt, have added to the grant for the relief of the son as well as the daughters of Henry Cort. It is to be hoped that even now his Lordship will provide means for the *immediate* relief of Mr. Richard Cort.

THE MOON'S ATMOSPHERE.

To the Editors of the Mechanics' Magazine.

Gentlemen,—In pursuance of the letter of "Nauticus," in your number of 1st of May, I am induced to suggest that a still stronger way of putting the question, is to ask whether the existence of combustion in the moon is not a proof that an atmosphere existed there *previously.* Can there be combustion, of any ordinary kind, without air to begin with?

I believe it is pretty generally admitted that appearances of combustion, probably volcanic, have been observed on the surface of the moon.

T. Perronet Thompson.

Blackheath, May 4, 1858.

HODGES' PATENT TRIANGULAR SCALES AND GAUGES.

Mr. R. E. Hodges, of Southampton-row, Russell-square, the ingenious inventor of the india-rubber accumulator springs, and other useful contrivances, has introduced a new description of scales and gauges, which are attracting notice at the Society of Arts' Exhibition of Inventions. The accompanying engravings illustrate the nature of these

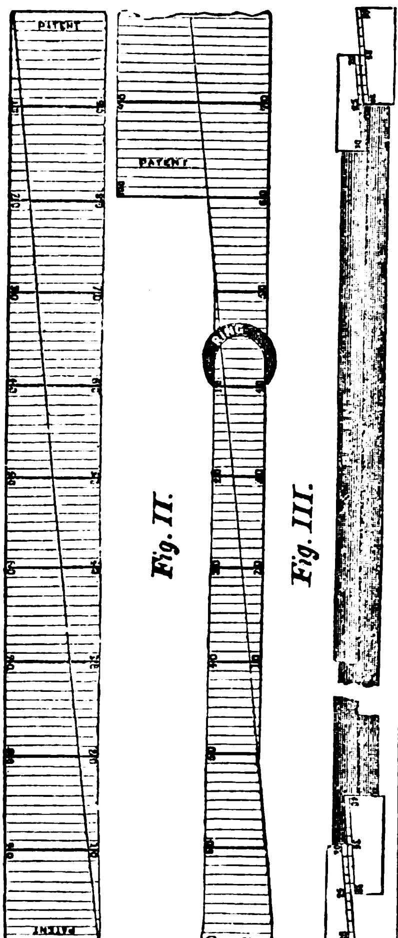


Fig. I. Fig. II. Fig. III.

instruments. Fig. 1 is a strip of wood, ivory, or metal, supposed to be 10 inches long and 1 inch wide, with a diagonal cut severing it in two. Each inch is divided into 10, and the whole into 100 parts (divisions of 50 to the inch, or 500 on the whole length, could be read off easily by the naked eye). It is evident that each move of the 10th of an inch of the one triangle upon the other, whether backwards or forwards, must decrease or increase the width of the scale the 100th part of an inch, and also that the scale will be parallel in those parts which overlap each other. Parallel lines may be drawn with this scale at equal distances, or at any desired distance from each other: and mechanical and other drawings (not curved) may be measured, the respective distances of their parts noted; and then reproduced on an increased or diminished scale.

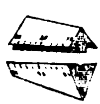
Scales of this description will enable a carpenter or other handicraftsman to set out tenons, as with them he can at one operation, that is to say, without shifting the scales, draw two parallel lines at any desired distance apart, and the width of the scale may be increased by using in conjunction with it any common rule or strip of known width.

Fig. 2. The triangles are here slided down until the width of the scale is narrowed to 50 hundredths or half an inch, and the manner of gauging a ring of that internal diameter is shown. It will be seen, also, that by reversing the position of the apices the width of the scale is increased.

Fig. 3. Two simple sections are sufficient to gauge the mouth of a tube; but when it is desired to gauge a tube (as, for example, a gun barrel) from one end to the other, then two sections may be employed, both capable of entering the tube, and to these sections may be attached rods, which may be graduated so as to show the distance of the sections from the mouth of the tube, when each gauging is obtained. In order to facilitate the readings of the gaugings, there are two sections attached to the upper ends of the rods, similar in all respects to the sections within the tubes, and as the rods are of equal lengths, the sections will always occupy corresponding positions, and the reading of the upper one will be the same as the reading of the lower.

Fig. 4. In order to keep the sections in

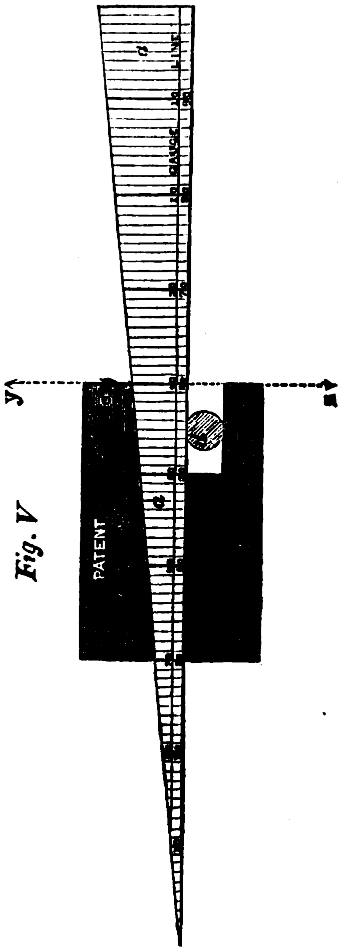
Fig. IV.



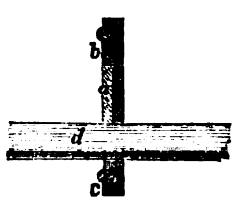
their proper relative positions, they may be grooved to fit one another, as in Fig. 4.

Fig. 5 shows the "gauge plate," made of

steel or other metal, or of wood, for gauging needles, wire, screws, sheet metal, turners' work, &c. The diameter, or the



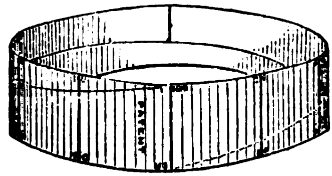
Section through y.z. Fig. V.



thickness, is read off at the arrow, where the opening is supposed to be one inch wide. It reads "60" hundredths, as the space occupied by the scale, which being subtracted from 100, leaves 40 hundredths of space occupied by the iron rod, *d.* But for greater simplicity there is a gauge line giving "40" at once as the real diameter sought. These gauge plates may be made of sizes to suit the requirements of different trades. The external form of the gauge plate makes it useful for the purposes of a common square.

Fig 6. A pair of triangles, graduated

Fig. 6.



either externally or internally, are set in a cylindrical form. The upper triangle may be divided into two parts, one part only being used at one time.

"The acknowledged 'confusion of gauges,' and the difficulty of taking minute and accurate measurement, called," says the patentee, "for a simple and inexpensive instrument to supply the want. The principle of these scales and gauges will be found correct. The parts or pieces by which the measure is taken are not easily injured or worn by common or even hard usage. The working is more easy in practice than in theory. Decimal figures may occupy one side of the scale, the old division of the inch (as used on the English foot rule) the other; and in France the centimetres will compare with the 'pouces et lines.' Thus mechanics of ordinary intelligence will soon understand, and no doubt prefer the decimal."

STEAM-SHIP PROPULSION.

BY CHARLES ATHERTON, ESQ.*

I HAD not purposed to take part in the discussion on Mr. M'Gregor's very interesting paper, read at your Meeting, on the 14th inst.; but, having been called upon, I could not decline to contribute a few remarks, the expression of which, however, I now beg to amend. Referring to Griffiths's heart-shaped propeller blade, with the narrowest part at the extremity, as distinguished from the ordinary screw, with the

* We have been requested to publish the above letter, which was addressed to the *Journal of the Society of Arts* subsequent to the reading of Mr. M'Gregor's late paper.—EDS. M. M.

widest part at the extremity, I intended to observe that, to have the maximum width at the extremity of the screw has been considered desirable, not, as reported, in order to gain power, but in order to apply the power advantageously by that portion of the propelling surface being the largest where the angle of the blade was supposed to be most favourable to effective propulsion. In prosecution of this idea, the great aim of many inventions has been to neutralize the centre part of the screw, doing the work entirely by means of the extreme portion. For example—some screws are merely flat discs, set at a given angle to the line of the vessel's motion, and fastened to radial arms, the central portion of the screw thus having no propelling effect whatever; and with the same object in view, a screw was designed by myself with a pitch increasing from the centre towards the circumference, thus neutralising the centre and throwing the great portion of the work upon the extreme portions of the screw. These principles of construction are directly antagonistic to that of Mr. Griffiths. Woodcroft, again, increases the pitch fore and aft, and other screws have been made with both systems of increasing pitch combined; and yet no principle of construction whatever has hitherto been recognised as that which developes the power of the engine with the greatest dynamic effect. This deficiency of our knowledge now, in the twentieth year of the practical application of the screw, is doubtless attributable to the fact that no rule or formula, combining the mutual relations of displacement, power, and speed, as ascertained on trial of a ship, has yet been publicly received and recognised in the mercantile world as a means of testing the comparative dynamic merits of ships. In fact, at the present day the character of a steam-ship, as it respects its dynamic properties, is a mere matter of opinionative assertion or braggadocio, not based on any recognised rule involving the mutual relations of displacement, power, and speed that the vessel may on trial be found to realize. It has been to remedy this deficiency in marine engineering as a science that I have for some time past publicly, through the proceedings of the British Association and of the Society of Arts, promulgated the suggestion that great benefit would result to the public interests of the country if every steam-ship, before being taken off the hands of her builders, were put upon a test trial, with a view to her character, as respects dynamic merit, being judged of by the numeric coefficient or index number resulting from the following rule, namely, multiply the cube of the speed by the cube root of the square of the displacement, and divide the product by the indicated horse power or by the consumption of coal per day expressed in cwts., the quotient being regarded as the index number, expressive of the dynamic merit of the ship, or as expressing the comparative dynamic merits of the various ships that may be tested by this rule. This or any other analogous system of measuring constructive merit by the relative performances of the ships themselves, would give deep-thinking, but unobtrusive, tongue-bound, and personally retiring constructors some chance of attaining that public fame which is one of the rewards of merit, and which every man may laudably covet. The public are the great losers by public fame being denied to merit because unobtrusive, and, consequently, unknown or buried in obscurity. The merit of a constructor should be determined by the performance of his ship, rather than that the merit of a ship should be inferred and taken for granted from the personal performances of its constructor. These remarks have been suggested by a practical fact which, in my various papers on steam-ship capability, I have before publicly referred to, and which I desire to take every opportunity of adducing and promulgating as evidence that steam-ship construction during the past twenty years has not been based on scientific principles, or even on inductive practice, conducive to progressive improvement; but it has been, in fact, a mere "happy-go-lucky" speculation; and the singular fact to which I refer is this—that even at the present day it is not prudentially safe for any steam-ship constructor to undertake a contract subject to the stipulation that the ship to be built shall, when tested by the rule above referred to, produce a coefficient or index number of dynamic performance equal to that which was produced by one of the first vessels to which the screw-propeller was applied, namely, H.M. steam sloop *Rattler*, which vessel, when immersed to a displacement of 1,078 tons, and propelled by engines working up to 437 indicated horse-power, attained a speed of 9·64 nautical miles per hour, producing an index number of dynamic merit, calculated by the rule above enunciated, equal to 215·5. I admit that this index number of dynamic merit has on several occasions been surpassed by steamers of later date, but such performances are mere occasional events, not usually attained or definitely accounted for in such manner as admits of their reproduction being calculated upon with such certainty as to be made the subject of contract guarantee. Can such a state of things be regarded as scientific? Surely steam-ship construction may be ex-

pected to embrace a definite realization of speed, with reference to displacement and power, before it can be regarded as a satisfactory development of science and art.

The extent to which private interests are occasionally ruined by the indulgence of injudicious chimeras as to steam-ship capability, and public interests sacrificed by the employment of vessels of a low order of dynamic merit, constitutes a national detriment of enormous magnitude. The shipping interests have it in their power in great measure to remedy this, simply by insisting on the dynamic merit of steam-ships being comparatively ascertained by some recognised formula, and regarded as one of the tests of the intrinsic value of ships, and by their affording to ship constructors statistical information as to the performances of ships at sea, whereby the best types of ships would thus become practically determined; the causes of excellence would be detected by comparison of the elements of construction; good ships only would then fetch a good price; constructive talent would be measured by the index number that may be earned by the actual performance. Excellence would thus be recognised, and meet its due reward.

CHARLES ATHERTON.

Woolwich Dockyard, April 21, 1858.

SHIPPING STATISTICS.

THE following circular has been addressed to shipping companies, shipowners, and others connected with the mercantile management and direction of ships:—

"*Committee on Shipping Statistics.*

"11, Buckingham-street, Adelphi, London, W.C., April 26, 1858.

"GENTLEMEN,

"The attention of the British Association at their late Meeting in Dublin having been directed to the consideration of Shipping Statistics, the Committee of the Association came to the Resolution 'that the application of science to the improvement of steam ships has been impeded by the difficulty of obtaining the necessary data from the present registration;' a Committee was thereupon appointed to inquire into this subject, which Committee begs the favour of your assistance, with a view to ascertain, from the general experience and records of shipping companies, shipowners, and others connected with the mercantile management and direction of shipping, what description of vessels has produced the best results.

"In the prosecution of this inquiry, the Committee desire now, in the first place, to ascertain what have been the actual sea performances of ships, and their attention being thus directed to instances in which the performance of particular ships has been remarkable, further steps will hereafter be taken to inquire into the circumstances of such cases, and ascertain the peculiarities of proportion and type of form of the vessels which have produced such results.

"With these objects in view, the Committee request the favour of your filling up the annexed form, giving an example of the quickest voyage made by each of the vessels of the line of packets under your direction, on the passage or station on which such vessels respectively may have been employed.

"I am, Gentlemen,

"Your very obedient servant,

"HENRY WRIGHT, Hon. Sec.

"*By Order of the Committee.*"

The information applied for includes—name of vessel and registered number; description of vessel—whether steamer or sailing vessel,—and her rig; detention on the voyage by stoppage at intermediate ports, or becalmed; load draught; length of vessel, as usually measured for builders' tonnage; outside breadth of the vessel, as measured for builders' tonnage; depth of hold; builders' tonnage; register tonnage; registered H.P.; coals consumed on voyage, if a steamer. In addition to the foregoing particulars, it is requested that the "displacement" of the vessels be given at the following draughts, if known:—When launched; when ready for cargo; when immersed to constructor's load-line.

PUMPS FOR RAISING WATER.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—As any new means of raising water may be important, perhaps you will give room to a plan I have acted upon with success, on a small scale, which was that of moving the pump and fastening the lower piston to the ground. I consider the manner in which this principle may be acted upon to advantage is, that two such pumps should be suspended, each at the end of a large scale-beam, or a beam on that principle; then, by a person's walking on the beam, he would turn the balance in favour of one of the pumps, by which the water would be raised. I consider the plan as new in principle; consequently its importance cannot be known.

I am, Gentlemen,

Your obedient servant,

CADOGAN WILLIAMS.

Ely-place, Holborn, May 3, 1858.

FORRESTER'S PATENT FASTENING FOR WATCHES.

Mr. Daniel Forrester, of Kingsland, has patented an excellent little contrivance for securing watches and other property to articles of dress. It consists of a peculiar kind of crank swivel fastening, which, in the event of the ordinary chain or guard being cut, or the bow of the watch broken, for the purpose of robbery, will secure the watch to the pocket or article of dress, and the removal of it will be rendered impossible without the wearer being made aware of the attempt. The patentee attaches the crank swivel fastening to the watch with a suitable length of chain, the end of which may be secured to the inside of the pocket or article of dress by any suitable means. The crank swivel fastening and chain may be made of gold, silver, or steel, and may be worn with or without the ordinary chain or guard. Fig. 1 is a view of the new crank swivel fastening. Fig. 2 is a section showing the extent of action of the crank. D, D, are two pins with a screw, tapped half way up to screw into and become a fixture with the parts B, B; the

Fig. 1.

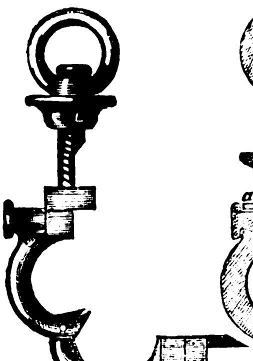
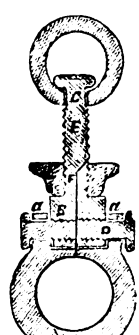


Fig. 2.



smooth parts of the pins D, D, work easily in the collar, shown at *a*, *a*. F is the ordinary way of making the joint, which is detained in position by the nut L, L, which works in this instance on a left-handed screw tapped on E. C shows the swivel at top. Fig. 1 shows the improved fastening open, which can then be put round the stem of the watch and secured by the nut, L, L.

THE PAYING-OUT OF THE ATLANTIC CABLE.

To the Editors of the Mechanics' Magazine.

Gentlemen,—I thank you for the information contained in your 1811th number of the *Mechanics' Magazine*, for I was glad to learn that Mr. Bright had taken out his patent for the apparatus for paying-out the Atlantic cable long before the idea of it entered my head, which was certainly not before the experiment was made on the cable. This being the fact, I am encouraged to request the favour of your inserting in your Magazine another of my details regarding that invention, which appears to me of great importance, and which may possibly have escaped the patentee's notice, considering how much his mind must have been occupied with many other important inventions and contrivances to promote the success of the great undertaking; whereas mine has had nothing to divert it from the subject excepting the pain and inconvenience I suffer incidental to my complaint. My only object is the endeavour to add my mite of usefulness, for on no account would I subtract an atom (if it were in my power) from the merit of the patentee, who has all the anxiety of practically carrying out his invention, on which the success of the experiment so much depends. I hope, therefore, that, should he read this communication, he will consider it in the light of my wish to be useful by details which may possibly not have struck him, and even if they have, no harm is done.

I proceed to state that, if proper and efficient means are not taken to prevent it, I have great apprehensions that, long before the 1,500 miles of cable have been run out, the grooves of the pulley wheels will be choked by unctuous matter, probably containing oil mixed with gutta-percha, tar, and whatever dirt, or grit, or substance the cable may have taken up, supposing it were true, as stated in the "Times," that the cable was to be immersed in oil until it was required to be used again.

The fact that 1,500 miles of cable has to pass over four pulleys makes a calculation of the quantity of matter which may be deposited in their grooves impossible; so resort can only be had to supposition. I will suppose, then, that one fathom of cable deposits, as it runs out, 1 dr. weight of matter in the grooves of the four pulleys, so that when the whole of the cable had been payed out, 5,156 pounds would have been deposited in the grooves, which is clearly much more than they would hold. I only make allusion to show how easily

the grooves may be choked by a very small amount of matter surrounding the cable, and, therefore, causing the cable to be lifted out of them. Such a length of rope running over pulleys is quite a new feature in practical engineering, and deserves every consideration, the more so, as a greater evil to the fair working of the machine could not be found. Now, the safest way would be, not to imagine that the oily matter would be of such a consistence as to weep from the pulleys, but, on the contrary, to make up one's mind, that the evil which I have predicted would certainly happen, and then to take efficient measures to obviate it. I will venture to express my belief that no engineer predicted that before one quarter of the cable had been payed out in the last experiment, lumps of matter would have accumulated in the pulley grooves of sufficient size to have lifted the cable out of them. (*Vide* the report in the *New York Herald* of the 2d of last September: "The throwing the cable off the wheels was caused by the accumulation of tar in the sheaves, which are not so deep or even so wide as experience has proved they should have been. The tar which is pressed out of the iron or protecting wire, as the cable passes over the wheels, sticks to the sheaves until it gathers in some parts in large lumps, which become hardened by exposure to the air. The effect is, to throw the cable off altogether, as occurred in the case just mentioned.")

I quote the above to show that what has occurred is sure to happen again, although perhaps not so soon, as no doubt the strain on the pulleys will be greatly diminished, and, therefore, less tar and gutta percha forced out between the wires.

I must now proceed with my endeavours to explain the remedies which I propose. I had imagined the revolving apparatus in question to be placed at least six feet above the central part of the platform, around which the cable is coiled, so that the arm which takes hold of the cable should revolve clear of men's heads. The next important point is, that a sufficient space in depth (say two feet) should be had *beneath* the platform to admit a man passing under it so as to get into the central part without incurring the smallest risk of his being caught by the paying-out cable; as I imagine that no greater depth could be accorded, I should place the man in a case made for the purpose, and lay him lengthways on his back. The case should have four rollers fixed to it, and iron rails to guide it from the exterior of the coil to the central platform. The case and the man within it, could then be shoved in and could be pulled out at pleasure—a handle for that purpose having been affixed to the case. The man now finding himself seated in nearly the centre of the platform—a fixed seat having been provided for the purpose—perceives that the machine works clear of his head, and that the coil of the cable has been securely boxed-up, both in its outer and inner circles, in the nature of a circular bin. The cable is running over his head as it pays itself out; still he feels perfectly safe, and is anxious to examine the pulley-grooves; but how is he to climb up to them with safety? Two seats opposite the outer and inner pulleys have been conveniently placed for him to examine those parts of the grooves over or under which the cable does not run; but how is he to climb up to the seats? By ladders with a few steps, the lower part of which are within his reach, he pulls one of the ladders down, climbs up, and, when seated, the ladder springs up in its place, from appliances made for that purpose, merely to lift its weight. This is done that, in the event of the man's falling from giddiness or any other cause, the ladders would be revolving clear of his body. The man now examines the grooves (lights having been provided from above on the plan of rail carriage lamps), and finds a good quantity of matter accumulated in them in lumps. How is he to get rid of it? He has been provided with a scraper, with a handle at one end and a lateral hole about the centre, the hole being for the purpose of slipping on to a bolt fixed to the framework of the machine, thus making a fulcrum for the scraper, which can be unshipped at pleasure, and permitting the man to clear it of its contents by the aid of another tool, and emptying them into a receptacle fixed on the left side of his seat. Great care must be taken so to place guards that, through ignorance or negligence, the man's fingers could not be jammed in the pulleys, which would be a serious misfortune. It would be the safest plan to place the end of the scraper from the motion of the pulley; or either way might be tried.

If it so turns out (as the cables are coiled away) that even a depth of two feet could not be obtained under the platform, even on one side of the keelson; in that case my next plan would be my only resource; that would be to provide an upright case for a man to stand in it, fitting in a square hatchway or scuttle, with guides to keep it steady in its place, and with appliances to lower it from the deck to the bottom of the platform in the shortest possible time, when the man springs out of it, and now the empty case is shipped up in double-quick

time. Both these operations could be performed in less time than it would take for one whole coil of the cable to be payed-out, especially should the vessel's rate be diminished for that purpose. Should men be required to watch the machine they could be easily relieved by the two methods which I have pointed out—the first being by far the safest and best.

With regard to the two fixed pulleys above-deck, they could be easily examined at any time merely by the case which guarded them being provided with loose boards, with bolts to fasten them.

May it not be necessary to affix to the framework of the pulley-wheels some guards to prevent the possibility of the cable being thrown out of gear, especially the inner pulley, as the cable is led on the under side of the sheave? With deep grooves such a catastrophe could not happen, provided there was a constant and steady strain on the cable; but in the event of the ship being stationary, I think the weight of the wire-rope might produce it.

Now, Gentlemen, I beg you will excuse my asking you to fill so much of the space of your valuable Magazine with what may appear to be such minor details, but such really require long explanations to be understood, if acted upon. And, again, you will have perceived that I am as anxious for the success of the Patent Revolving Paying-Out Atlantic Cable Apparatus as if I were the real patentee of it. I have stated, as well as I am able, how to overcome its greatest enemy; independent of which I cannot see any reason why the 1,500 miles of cable should not be payed-out with the greatest ease, provided the ship's way is not arrested by gales of wind or other adverse circumstances.

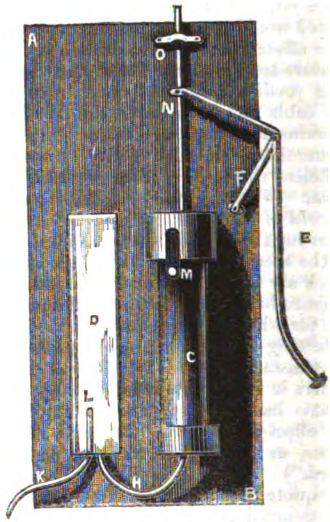
I am, Gentlemen,
Your obedient servant,
MOLYNEUX SHULDHAM,
Commander R.N.

The Manor House, Dursley, Gloucestershire,
April 28, 1858.

AN IMPROVED LIFTING PUMP.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—A description of a small lifting pump, that I have been using for some time in my laboratory, may be interesting to some of your readers. The well from which I draw the water is some yards distant laterally and 16 feet below the level of the pump, which is within doors. The tube from the well to the barrel of the pump is gutta percha and one inch diameter; the pump barrel is 3 inches diameter and 12 inches stroke. Notwithstanding all the precaution I could take, the junction of the tube with the pump was constantly getting out of order. This was owing to the closing of the fixed valve in the pump with a *jerk* when the sucker, holding the moveable valve, was on the point of descending. I found, also, that the tube itself was too small when the pump was worked with ordinary velocity. Both these annoyances I have remedied by a very simple contrivance. A B is a plank secured



by bolts to the wall of the laboratory. To this plank is fastened, in the ordinary way, the small lifting pump C, and the vibrating handle N E. I pass the pump rod through a guide, O, at the top of the plank, by which means the sucker is prevented from rocking in the barrel of the pump. There is less friction, and the parts last longer. D is a wooden box, secured to the plank by a couple of wood screws passing through the back of the box into the plank. This box is well painted inside and outside, to make it air-tight. It is 3 inches wide and 18 inches long, and, when secured in its place, the front of the box is glazed with a stout pane of ordinary plate-glass. A short bent tube, H, communicates between the bottom of this box and the bottom of the pump. The gutta-percha tube from the well enters the bottom of the box also, and rises 5 inches above the bottom to L, in the glazed box. When the handle, E, is worked a vacuum is created in the box, and the water is *seen* issuing in a jet through the orifice, L, of the tube, and, falling down to

the bottom of the box, is drawn through the bent tube, H, into the pump, and delivered at the nose, M. The water no longer rises in jerks, but in a constant gush, so that the tube is no longer too small. Another advantage is, that a pump thus constructed cannot become *dry*, as it is called, for the water in the pump barrel cannot sink below the level of the top of the tube, L, in the air box.

I am, Gentlemen, faithfully yours,

THOMAS LANGAN.

Prienstown House, April 29, 1858.

STABILITY OF FLOATING BODIES.

To the Editors of the Mechanics' Magazine.

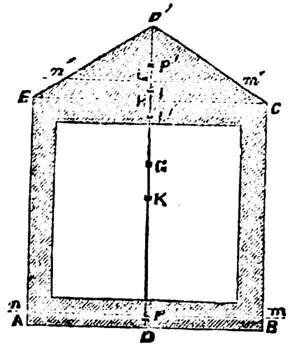
GENTLEMEN,—Having read the various communications in your last three or four numbers on the stability of floating bodies by "Nauticus," "W.," and "A Mechanic," with a good deal of interest, I trust you will allow me to make one remark on the subject.

It is respecting the question referred to both by "W." and "A Mechanic," viz., that in the case of *stable equilibrium*, the distance between the centres of gravity and buoyancy is less than in any of the positions of *unstable equilibrium*.

"W." has discussed this question with becoming caution and reserve, a circumstance which clearly indicates his knowledge of the subject and capability of grappling with its difficulties; but your ingenious correspondent, "A Mechanic," has been, in my humble opinion, a little less prudent, by plunging at once into mathematical inferences to which I cannot at present yield a ready assent.

It has been correctly stated by "W." that the general proposition would be difficult to assert; hence, I have reversed the inquiry, and sought for a floating body in which the proposition is *not true*.

Let the adjoining figure be a vertical



section of a hollow prism of any length, A B C E being a square whose side is 24 feet, and E D' C being an isosceles triangle whose vertical height is 9 feet.

The hollow part of the prism is a square whose side is 18 feet and the centre of which is K, the centre of the square A B C E.

To find the centre of gravity G.

It is readily seen that, $$D\,G = \frac{(24^2 - 18^2) \times 12 + 12 \times 9 \times 27}{(24^2 - 18^2) + 108} = 16\tfrac{1}{2} \text{ feet.}$$

Now, if I is the metacentre, then

$$D\,I = 1 + \frac{2 \times 24^3}{3 \times 24 \times 16} = 25 \text{ feet.*}$$

(See my "Mensuration," pages 59 and 61, and Fincham's "Outline of Ship-building," page 162.)

Again, let the prism now float with the triangular portion E C D' immersed, so that $n'm'$ is now the water line.

To find L D'.

It is evident that, $$\frac{n'm' \times L\,D'}{2} = 24 \times 2 \quad . \quad . \quad . \quad . \quad (1)$$

By similar Δs, $$\frac{n'm'}{24} = \frac{D'\,L}{9}$$

Then, $$n'm' = \frac{8 \times L\,D'}{3} \quad . \quad . \quad . \quad . \quad (2)$$

Substitute the value of $n'm'$ as given in equation (2) in equation (1).

Then, $$\frac{4 \times D'L^2}{3} = 48, \text{ or, } D'L = 6 \text{ feet.}$$

By equation (1), $n'm' = 16$ feet.

* On reading over this letter it became evident to us that our correspondent would have facilitated the comprehension of it had he here stated, as he has premised, that the assumed water line is *m n* and the depth of immersion (*A n*) 2 feet.—EDS. M. M.

If I' is the metacentre corresponding to the line of flotation $n'm'$, then

$$D'I' = 4 + \frac{2 \times 16^3}{3 \times 8 \times 48} = \frac{100}{9} \text{ feet} = 11\tfrac{1}{9} \text{ feet.}$$

Now, in the case of $n\,m$ being the line of flotation, or A B being the part immersed, the prism is in a state of *stable equilibrium*; because the centre of gravity, G, is *below* the metacentre I.

When, however, the line $n'm'$ is the line of flotation, or the triangle E D' C is the part immersed, the prism is, in this case, in a state of *unstable equilibrium*; because the centre of gravity, G, is *above* the metacentre I', the line $D'I'$ being $11\frac{1}{9}$ feet, and the line $D'G$ being $16\frac{1}{3}$.

If P, and P' be the centres of buoyancy in the positions of stable and *unstable equilibrium* respectively, then $D\,P = 1$ ft. and $D'P' = 4$ ft.

In the case, then, of *stable equilibrium*, the distance between the centres of gravity and buoyancy is $P\,G = 15\frac{1}{3}$ feet; but, in the case of *unstable equilibrium*, the distance between the centres of gravity and buoyancy is $P'G = 12\frac{1}{3}$ feet; which is 3 feet less than in the former case.

To connect the height of the line $n\,m$ with the specific gravity of the prism, it is only necessary to put D and D' for the weight of a cubic foot of water and the weight of a cubic foot of the prism respectively.

$$\text{Then,}\quad 24 \times 2 \times D = \Big((24^2 - 18^2) + 12 \times 9\Big) \times D'$$

$$\text{From which}\quad \frac{D'}{D} = \text{specific gravity of the prism} = \frac{2}{15}$$

Therefore, if I have rightly apprehended the proposition to which reference has been made by "W." and "A Mechanic," and the numerical computations here given are correctly performed; then I conceive the prism, whose dimensions are here given, is an exception, at least, to the generality of the proposition.

I am, yours, very faithfully,

ROBT. RAWSON.

Portsmouth, April 28, 1858.

[There can be no doubt that Mr. Rawson has *not* "rightly apprehended the proposition to which reference has been made by 'W.' and 'A Mechanic';" but we think we shall best satisfy the desires of our numerous readers who take an interest in this subject, if we leave our able correspondent, "A Mechanic," to vindicate his own cause.—EDS. M. M.]

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—My former communication upon the above subject has produced four letters, which I deem highly creditable to their writers. It appears that I misapprehended Mr. Moseley's meaning, and it is due to him to make this admission; but whether my mistake arose from any defect in his exposition of his theory, or from a want of perspicacity on my part, is a matter hardly worth inquiring into; perhaps, as the Spectator said to Sir Roger de Coverley, "There is much to be said on both sides."

In this investigation I am very desirous that, as much as possible, the illustrations should be of a *simple* and *familiar* character; and that *actual* phenomena, not *factitious*, should be contemplated. Your talented correspondents may be assured that the subject is but very imperfectly understood generally, either on the quarter-deck or in the mould loft.

It appears to me to be objectionable, for instance, when a floating body is deflected from a position of instable equilibrium to direct us to conceive of it moving "round its centre of gravity," which it never does except when that centre is coincident with the *meta-centre*, and the position one in which the equilibrium is that of *indifference*. For, when the body is deflected through a small angle from instable equilibrium, *the metacentre*, during the indefinitely small span of time required, is the axis of rotation, and the centre of gravity describes an arc of a circle of which the *metacentre* is the centre. The form of the immersed portion of most bodies continually changes as the body is deflected; its centre of buoyancy consequently has a continually shifting position, the *metacentre* is correspondingly affected; but at any instant, and at every instant, the *metacentre* is the neutral point round which motion takes place. The difference, then, between instable, indifferent, and stable equilibrium is this:—In the first the centre of gravity describes an arc *above* the *metacentre*; in the second the centre of gravity is *in* the *metacentre*; and in the last the centre of gravity describes an arc *below* the *metacentre*; when the body is slightly deflected from its position.

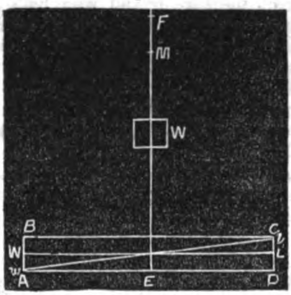
Those who can only be gratified by a mathematical investigation of the subject

may find much amusement in Dr. Bland's *Elements of Hydrostatics*, in which the subject is ably and lucidly treated. As I do not write for mathematicians I content myself with quoting a sentence from that work. "The stability, therefore, will be positive, or negative, or nothing, according as the *metacentre* is above, below, or coincident with the centre of gravity of the floating body." The subject has been elaborately examined by other mathematicians; but those who are adroit in the use of Algebraic symbols, and who justly appreciate their immense value, can scarcely imagine how little benefit practical men, even of considerable eminence, derive from clusters of letters and signs, which, it may be, are the memoranda of a process of the most profound, conclusive, and useful mathematical induction. This seems to arise from two causes: 1st. A general deficiency in Algebraic skill among practical men. 2d. The very questionable character of the postulates which, in many instances, form the bases of the Algebraic structure.

I am desirous of presenting, with as much simplicity as possible, two more phases of the subject, which I hope may tend to its further elucidation.

As the form of the immersed portion of most floating bodies varies when rotatory motion takes place, and the centre of buoyancy changes its position with such variation, that fact and its result must in all cases be taken full cognizance of. But the part of the body kept above the water produces all its effect in its centre of gravity.

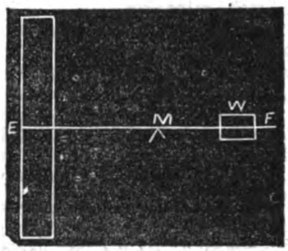
Fig. 1.



Let A B C D be a transverse section of a shallow rectangular box. E F, a rigid perpendicular raised in its centre, W L its normal plane of flotation, and, w *l*, the same plane when it is deflected; and W a leaden weight made to slide upon the perpendicular, E F.

If this weight be placed so as to make the centre of gravity of the whole mass coincident with the metacentre, which may be at M indifferent equilibrium results,—if placed higher instable equilibrium takes place, and if placed lower we have stable equilibrium. By assuming dimensions and employing the simple formula before mentioned we can find the position of M. Let W L = 15. Depth of water = 1. Then $\frac{2}{3} \times \frac{7\cdot5^3}{15} = 18.75$ ins. height of *metacentre* above centre of buoyancy; consequently it is 18.75 + .5 = 19.25 ins. above the bottom, A D. Balancing the body, as in Fig. 2, upon a point placed at

Fig. 2.

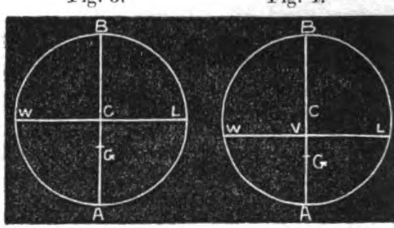


this distance from E, on putting it into the water its equilibrium is found to be that of indifference; if the weight be moved toward F the equilibrium becomes instable, if towards E it becomes stable.

Let those who may smile at the simplicity of this illustration try its effect upon the first six shipmasters or foreman-shipwrights they may fall in with, and at the same time exhibit to them the least recondite page of Leslie, Bland, or Moseley, upon the subject, and if they have any utilitarianism in their natures, I think they will be induced to pardon this simplicity.

If a homogeneous cylinder be placed in the water, whatever its specific gravity may be (assuming that it is less than that of water), it obviously has no permanent stability in any position. Therefore, if the theory of *metacentre* is true, its metacentre must be in its axis.

Fig. 3. Fig. 4.



Let the circle A W B L be a section of such a cylinder, of half the specific gravity

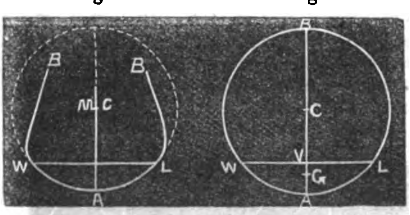
of water, with its centre of buoyancy at G. Then, it has been demonstrated, the distance, C G, is $\frac{2}{3}$ of a fourth proportional to the arc, W A L, its chord, and its radius. Now the arc is $\frac{3.1416}{2} = 1.5708$, chord $= 1$, and radius $= .5$. So that 1.5708 : 1 : : 5 : $\frac{2}{3}$ C G or C G $= .2122$, distance of centre of gravity of the cylinder from the centre of buoyancy.

Applying the formula for ascertaining the metacentre we have half-breadth at water-line $= .5$, and immersed volume $\frac{.7854}{2} = .3927$ and $\frac{2}{3} \times \frac{.5^3}{.3927} = .2122$, height of metacentre above centre of buoyancy, which is the same as above, and thus the two centres are in the same point.

Taking another cylinder of less specific gravity, Fig. 4, W becomes the water-line. Let the versed sine V A $= .4$. Then by tables of areas of circular segments we have area W A L $= .29337$; sine W V is $\sqrt{(.5^2 - .1^2)} = .4899$; and $.4899 \times 2 = .9798$ chord or water-line W L. It has been shown that the distance of the centre of gravity of a circular segment from the centre of the circle is equal to the twelfth part of the cube of twice the ordinate (or chord of the segment) divided by the area of the segment. Using this rule to find the position of G, we have $\frac{.9798^3}{.29337 \times 12} = .2672$. Distance between C and G. And by our rule for metacentre, $\frac{2}{3} \times \frac{.4899^3}{.29337} = .2672$, as before, thus making the axis and metacentre coincident.

One more instance will confirm this. In Fig. 5 the water-line is at a greater distance

Fig. 6. Fig. 5.



from the axis of the cylinder. Put versed sine V A $= .2$. Tabular area of immersed portion would be .111824; sine W V is $\sqrt{(.5^2 - .3^2)} = .4$ and $.4 \times 2 = .8$ chord or water-line. Employing the same rule as in the last case, we have $\frac{.8^3}{.111824 \times 12} = .3816$, distance between C and G. And $\frac{2}{3} \times \frac{.4^3}{.111824} = .3816$, height of metacentre, which is in the axis as before.

It is then evident that if the immersed portion of a floating body be a segmental portion of a cylinder that the metacentre is in the axis of the whole cylinder, however large or small that portion may be; and whatever be the form of the body above the water, provided the immersed part be such a segment, the metacentre is in the centre of the circle of which its arc forms a part; and its stability will be measured, if it is a body of an heterogeneous nature, by the distance at which its centre of gravity is placed below this point. Thus, in Fig. 6, the part above the water may be W B B L. Still if the part immersed, W A L, be a segment of a circle, the metacentre is at the centre of the circle, C. But if the body were deflected, as the two parts, W B and L B, depart from the circle, and the emersed and immersed portions would differ, the centre of buoyancy and metacentre would speedily change their places.

I am, Gentlemen,
Your obedient servant,
NAUTICUS.

THE SURVEYORSHIP OF THE NAVY.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Your strictures upon the eulogist who has so indiscriminately and absurdly lavished his valueless praise upon the late Surveyor of the Navy will be read with great pleasure by all who have the interest of naval science at heart; and who, consequently, are disgusted with charlatanism, from which it has so much suffered.

Your remarks with regard to the present Surveyor's department at the Admiralty have also justice in them. The reminiscence of the Russian war, to those who built the despatch-vessels and gun-boats is an exceedingly painful one. Ruin befell one or two of those builders, and all sustained heavy pecuniary loss. The tyranny manifested by the working shipwrights, while they were in the ascendant, will ever be a dark patch in the unpleasant picture. The only relieving light it has is the indelible impression which the urbanity and sympathy of Sir Baldwin Walker evinced; and the appropriateness and beauty of form of the vessels which his immediate assistants designed.

May I inquire whether you can throw any light upon the following extract? I

find it in print with the name of a scientific nautical gentleman of high character as its author:—

"It is generally understood that the engines fitted on board the block-ships sent to the Baltic, and in the gun-boats and despatch-boats which were prepared subsequently for that service, *are more or less failures.*"

The poor builders have sacrificed their money to little purpose, if such is the fact.

I am, Gentlemen,
Your obedient servant,
NAUTICUS.

[The failure of the engines (exclusive of the boilers) referred to has not yet come to our knowledge, nor do we believe the statement quoted deserves any more credit than most of the vague statements which are occasionally floated with the view of damaging the Admiralty administrators. We will, however, inquire into the subject.—EDS. M. M.]

A PERPETUAL CLOCK.

[The following letter is from a gentleman of undoubted honour, and who is above all interest in the ingenious tradesman of whom he writes.—EDS. M. M.]

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I believe it has been the custom, from time immemorial, among nine-tenths of our scientific people, to view the hitherto occult theory of "perpetual motion" as a chimera, and to regard the remaining few, who will still, night after night, expend their midnight oil in efforts to bring the said occult principle to light, with as little sympathy as those who once dreamed away the better part of their existence while groping for the philosopher's stone.

It is quite unnecessary to remind gentlemen of your scientific experience that it is not to the more fashionable streets, nor to the more wealthy classes of our manufacturers, that the most substantial merit is confined, and that many a useful invention, from the absence of means on the part of its designer for working it out himself, or a want of the necessary tact for securing the cooperation of others to the same end, has been lost to the world. I will proceed, therefore, at once to inform you that, in a small out-of-the-way street of Plymouth (Drake-street) there is exhibited, in the unpretending shop-window of a watchmaker, named Chenhall, a clock of the size of an ordinary eight-day clock, with a novel and exceedingly simple movement, and which, simple as it appears, is nevertheless said to be gifted with the property of going as long as the durability of the materials permits, without the aid of weight or spring,—in short, without any manual assistance whatever.

I beg to state that I have no personal interest in the affair whatsoever, nor am I even acquainted with the nature of the unseen agency which has been called in by Mr. Chenhall to effect his purpose, and which the latter does quite right in concealing from public view; but this I know that the hidden part occupies but a very small space, and that one glance at the mechanism *which is visible*, seems to me sufficient to satisfy the most sceptical that Mr. Chenhall's assertions may be relied on.

By affording space for this letter in your columns, which are impartially devoted to the scientific schemes of all entitled to consideration, whether rich or poor, you may be the means of drawing public attention to an intelligent tradesman, and bringing perhaps a useful invention into use.

I am, Gentlemen,
Your obedient servant,
A SUBSCRIBER.

Plymouth, May 1, 1858.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

PLUNKETT, W. G. *Improvements in the application of new materials to the manufacture of paper pulp and yarn for textile fabrics, cordage, &c.* Dated July 29, 1857. (No. 2069.)

Here the following materials are employed, viz., the bark, leaves, and stems of wood of the "Lavatera Arborea" (sea tree mallow), otherwise called "Alborem marina nostras," also the bine or straw of "Humulus Supulus," or hop plant, and the "Trifolium pratense" or "rubeus" (common red clover). The preparation of these materials is effected by ordinary chemical or mechanical means.

IVORY, T. *Improvements in rotary and reciprocating steam engines.* Dated July 30, 1857. (No. 2076.)

This consists in producing the rotary or reciprocatory motion of the engine by the use of steam or water, &c., so as to cause a recoil or reaction of one or more revolving or reciprocating bent arms through which the fluid issues, and which are open at the outer extremity.

FREARSON, J. *Improvements in feeding, cutting, shaping, and piercing metals.* Dated July 30, 1857. (No. 2077.)

This consists of certain mechanical ar-

rangements and processes especially applicable to the manufacture of buttons, eyelets, and other articles of the like manufacture. The invention cannot be clearly described without engravings.

FORSYTH, T. *Improvements in and applicable to side valves for steam engines.* (A communication.) Dated July 31, 1857. (No. 2083.)

The object here is to reduce the pressure on such valves, thereby economising the power required for working them, and diminishing the wearing of the valves and their seatings, and of the machinery by which they are put in motion. A plate is applied to the back of the valve, to which pressure is given by a wedge acted upon endwise by an adjustable external spring. A second spring is applied to the back plate and wedge acting on the valve, so as to allow it to rise off its seating. If necessary, provision is made by set screws passing through the lid of the valve chest, or otherwise, for keeping the valve up to its seating as it wears away. The back of the valve is open, thereby allowing the steam to assist in liberating it, and also to assist in adjusting the valves to the ports.

CAZALAT, A. G., and A. HUILLARD. *An improved apparatus for and mode of manufacturing sulphuret of carbon, animal charcoal, and carbonic acid.* Dated July 31, 1857. (No. 2085.)

This invention cannot be described without engravings.

MARKLAND, T. *Certain improvements in power-looms for weaving.* Dated July 31, 1857. (No. 2086.)

This consists, 1st, in a method of impelling the shuttle, and obtaining thereby the requisite throw of the shuttle, by means of a direct action from the crank shaft. 2d. In the method of mounting and driving the slay sword and slay. 3d. In the manner of actuating the healds. This invention cannot be described without engravings.

GENHART, H. *An improved apparatus for cleaning and sharpening knives, and cleaning spoons and forks.* Dated July 31, 1857. (No. 2087.)

This consists of a cylindrical brush fitting tightly in a metal tube. The said tube is supported and closed at its ends by metal standards, through the centres of which pass an axle, on which a circular brush is fixed, and revolves therewith, by means of a handle fixed on one end of the said axle. On the other end of the aforesaid axle, and at the outside of that standard which supports this end of the tube containing the circular brush, a narrow circular brush is fixed, and designed for the purpose of cleaning the ferrules of knives simultaneously with the blades thereof, and by substituting another brush in place of this last-mentioned brush spoons may be cleaned. The blades of the knives are introduced into the apparatus through slits or openings formed in the rim of one of the standards thereof. On the uppermost part of the aforesaid tube is a receptacle containing brick dust, &c., which passes by an outlet to the brush in the tube.

INMAN, G. *An improved construction of locomotive engine.* Dated July 31, 1857. (No. 2089.)

This consists in economising motive power when applied to locomotion. The patentee causes high pressure steam or other motive power to expand a series of hollow discs or chambers arranged around the boss of the driving wheels of the locomotive. These discs, &c., are connected by radial pipes to the boss of the wheel, and have attached to the outer or moveable ends radial rods, which pass through the periphery of the wheel, and may carry feet which bear upon the road or way in succession for the purpose of pressing the engine forward. The steam, &c., is conducted through a hollow axle of the driving wheel to the boss of the wheel, whence it passes through the radial steam pipes to the several hollow discs, &c. Or the same is conducted through pipes passing through the boss, and connected to and communicating with the radial steam pipes and working discs, &c. At the inner end of the boss of each driving wheel is an annular valve, which admits and discharges the steam at the proper time to and from the several steam chambers in succession, and by an arrangement of shifting gear the position of this valve may be changed at pleasure, so as to reverse the motion. He prefers to make the working chambers of discs of india-rubber, joined together at their outer edges by a ring of metal, which will prevent them from expanding in the direction of their diameter; but when great power is required to be exerted, the expanding and contracting chambers may be made wholly of metal.

BEALE, J. *An improved construction of rotary engine, applicable for pumping and measuring fluids, or for the production of motive power.* Dated July 31, 1857. (No. 2090.)

Here the patentee uses a single slide or piston, which is mounted on an axle suitably slotted to receive it, and allow of its moving freely. The interior of the cylinder is made truly cylindrical, and the rotary axle which carries the slide or piston is set, as heretofore, eccentric thereto. A fixed stop may be fitted to the cylinder, or in place thereof the

axle may itself bear against the periphery of the cylinder, and form the division between the passages for the inlet and escaping steam. In order to keep one end of the piston always in contact with the cylinder, he forms recesses in the cylinder ends, and lateral projections on the piston to work therein.

HARRIS, W. J. *Improvements in the construction of dining and other tables.* Dated Aug. 1, 1857. (No. 2091.)

This consists in the application of the combined arrangement of the levers known as the "lazy tongs" for the purpose of expanding or contracting telescope and sliding dining tables, the same being actuated by the aid of one or more screws, by racks and pinions.

AROUX, G. F. *Improvements in seed drills.* Dated Aug. 1, 1857. (No. 2084.)

This consists, 1st, in the application to ordinary seed drills of as many hind wheels or rollers as there are discharge pipes for depositing the seed, so that each wheel may correspond exactly with each drill sown. 2d. In the construction of a seed drill, which consists in employing two small moveable steering wheels, in a mode of gearing, in the use of three or more hollow cutters, in the use of a seat for the driver, in the use of shafts for drawing the drills, in means for raising the wheels when not in use, and in the peculiar form of the felloe of the hind wheels.

MAW, E. *Improvements in constructing railway crossings, points, and switches.* Dated Aug. 1, 1857. (No. 2096.)

Here the point rails, the wing rails, and the check rails of crossings, and the stock rails and tongue rails of switches are made of wrought steel; and, to give strength and stiffness to crossings, horizontal bars of angle iron are used between the wing rails, the points, and point rails, and such rails and strengthening bars are bolted at intervals. Like horizontal bars are used between the stock and tongue rails of switches, to give strength and stiffness thereto, and are fixed to the stock, or to the tongue rails. The tongue rails of switches are also made with ribs on the inside and outside.

RICKETT, T. *Improvements in implements for cultivating land.* Dated Aug. 1, 1857. (No. 2097.)

These apply to implements having tines set round a rotary axis. The frame of the implement runs on two or more wheels, and the rotating axis, on which the tines are set when moving over the land, comes only a small distance above the surface of the land. The implement is arranged to be moved by a locomotive steam engine or other power. The tines of the implement are all similar to each other in form, and are set one after the other around the axis or shaft, so as to cut or enter into the land in succession. The cutters or tines are each made a few inches wide, and it is preferred that each boss on the axis or shaft should only have two tines formed thereon, and that such two tines should come at opposite sides of the axis or shaft. The tines are made of a curved form, and their axis or shaft is caused to turn by means of the locomotive engine or other power, so that the cutting or outer end of each tine in its revolution enters the land at a point considerably behind its axis of motion, and as the axis is moved forward, and is caused to revolve, the end or cutting edge of each tine rises out of the surface of the land considerably in advance of the axis of motion. The tine raises up the portion of the land removed by it, and such cut portion is then carried over the axis or shaft.

HOPKINSON, W. *Certain improvements in steam engines.* Dated Aug. 1, 1857. (No. 2098.)

This relates to the working of slide valves, and consists in an arrangement of valve gear, whereby the motion of the slide is so modified as to be relatively slower in the middle and more rapid nearer the extremes of the traverse, as compared with the like motion derived from the common eccentric. It also relates to the arrangements of the parts of engines having two steam cylinders. The invention cannot be described without engravings.

BROOMAN, R. A. *Improvements in circular sawing machinery.* (A communication.) Dated Aug. 1, 1857. (No. 2100.)

This consists in fitting over a circular saw a semicircular metal envelope, held by a bar made to travel up and down in a standard upon motion being communicated by a screw, and having combined with it, just in front of the saw, a set of rods and levers connected and adjusted so as to allow of the passage of the wood to be cut, and to fall down upon the saw bench or bed immediately after the wood has passed, and thereby prevent injury to the workman or attendant feeding the saw. It also consists of a regulating gauge for determining the breadth at which the wood is to be cut.

PETTIT, G. B., and H. F. SMITH. *An improved cap or cover for the glasses of gas and other lights.* Dated Aug. 1, 1857. (No. 2101.)

This invention was described and illustrated at page 131, No. 1774, Vol. 67.

DAVISON, R., and J. LEE. *Improving the edge or selvage of linen, cotton, woollen,*

silk, or any other cloth or fabric, while in the act of weaving. Dated Aug. 3, 1857. (No. 2103.)

This consists in the use of one strong thread as the outside warp thread of each of the edges of the fabric.

ELCE, J., and J. LEECH. *Improvements in self-acting temples for looms.* Dated Aug. 3, 1857. (No. 2104.)

This relates to "side roller temples," and consists in the application of guide rollers to the caps of such temples, to prevent the rubbing of the fabric against the edges of the caps. It also consists in setting roller temples in a diagonal position for distending the fabric as it is drawn through the temples.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

KENYON, H. *Improvements in the treatment of certain compounds of silica, alumina, sodium, or potash, and the application of such compounds in the processes of printing, dyeing, tawing, paper making, or in any other process in which the alumina of commerce is employed.* Dated July 29, 1857. (No. 2066.)

The inventor takes ordinary clays or spars (such as fluospar and felspar) composed of various quantities of silica, alumina, water, and as little iron or lime as possible. He prefers those which contain about 46·29 parts of silica, 40·09 of alumina, peroxide of iron 27, lime 50, water 12·61, in 100 parts. In the case of employing clays, he dries the clay, and grinds it in an ordinary clay mill. He then calcines it, or not, as preferred, in a furnace, driving off the water, and rendering the clay more porous, and carbonising the iron, rendering the clay more easily acted upon by sulphuric acid; or he can dispense with the calcination by the additional heat obtained by the decomposition of the salts. Or in the employment of spars he takes spars of component parts as the clays before-mentioned, and grinds them in an ordinary mill for that purpose, and calcines, or not, when they are ready for use. He takes two parts of clay or spar, or both combined, and adds one part of marine salt, muriate of soda, or nitrate of soda, or nitrate of potash, one and a-half parts of boiling water, and dissolves one-eighth part of Glauber salts, or acid, sulphate of soda, or sulphate of potash, and adds it to the above-named spars or clays and salt, and puts it in a pot or cylinder, or any convenient furnace, and mixes with it one part of concentrated sulphuric acid, 1·850 specific gravity, and drives off and collects in a tower or jars the hydrochloric acid; or the aquafortis of nitrates are used, or put two parts of clay, one part of marine salt, or nitrate of soda, or potash, and two and a-half parts of sulphuric acid, 1,350 specific gravity, or thereabouts, but he does not confine himself to these exact proportions. He takes the residue, and submits it to a furnace as used by soda-ash makers, heated by the residue of heat from the pot, or any other kind of furnace, until the whole of the hydrochloric or nitric acid gases are drawn off.

TAYLOR, S. L. *Improvements in steam engines.* Dated July 29, 1857. (No. 2067.)

This relates, 1st, to the metallic packings of the pistons, and consists in making the packings of a single ring or annular belt of metal, cut through at one part, and furnished with a tongue piece at such separation, which is fitted accurately within a recess formed in the packing ring for its reception. 2d. To fixing the cylinder on the boiler of portable or other engines, and consists in carrying the front and back plates of the steam chest or space above the fire-box up above that part of the boiler, and placing the cylinder between such plates, and fixing it thereto by its flanges. 3d. To guides for controlling piston rods in their reciprocating motion. 4th. To the side valves of steam-engines, and consists in forming the moving cover or valve which covers the two ports in two parts detached from each other.

JONES, W. E. *Improvements in the manufacture of iron plates, such as boiler plates, plates for ship building, and other similar purposes, and also in machinery for the manufacture of such plates.* Dated July 29, 1857. (No. 2068.)

The inventor constructs the plates above-named with extra thickness at certain parts, to give increased strength at the point where the plates are punched for rivets. This is effected by means of grooved rolls.

COTTAM, G. H., and H. R. *Improvements in the manufacture of children's cots and metallic bedsteads.* Dated July 29, 1857. (No. 2070.)

In constructing children's metallic cots which have cane work applied thereto in place of leaving the rough portions of the cane which protrude through the metal frame uncovered, the inventors cover such protruding parts. In manufacturing the various parts of metal bedsteads, they are first ground or polished, then placed in a suitable bath, and a deposition of brass is caused to take place thereon by electric currents.

BURNETT, J. *Improvements in the manufacture of chloride of lime or bleaching*

powder. Dated July 29, 1857. (No. 2071.)

Here, instead of working the stills and chambers used detached, as is now done, the inventor proposes to work them all, in common collecting the chlorine gas as it is produced in the stills into one main pipe, which would convey the gas either directly to the chambers, or, what would be better, to a common reservoir of any convenient size, in which it might be cooled and purified from the muriatic acid gas and vapour it generally contains, by a small stream of water running through the reservoir. From this reservoir the gas would then be conveyed by another main pipe to the chambers containing the lime. There is an arrangement of cocks, &c., for cutting off communication when required.

CLARK, W. S. *Improvements in kegs for holding gunpowder, and articles of a similar nature.* (A communication.) Dated July 30, 1857. (No. 2072.)

This mainly consists in the employment of corrugated metal cylinders so made as to resemble the ordinary wooden keg, these corrugations giving strength and convenience for handling.

PURCELL, J. *Improvements in attaching or securing buttons to articles of clothing.* Dated July 30, 1857. (No. 2073.)

This consists in the use of wire for fastening buttons to articles of clothing.

COULSON, S. *Improvements in preparing solutions for coating with aluminium.* Dated July 30, 1857. (No. 2074.)

Here cyanide is used, and the turpentine, by preference, produced as follows:—Into a solution of cyanide of potassium in water is introduced a plate or anode of aluminium attached to the positive pole of a galvanic battery, and a plate of copper or other similar anode is attached to the negative pole of the battery, the solution of such latter pole being separated by a diaphragm. By this means the aluminium will be dissolved, and a proper solution thereby prepared, which is to be used in depositing, by electric means, as like solutions of silver and gold are now deposited.

MCKINLEY, W., and R. WALKER. *An improvement in the manufacture of moulds for forming the soles of boots and shoes.* Dated July 30, 1857. (No. 2075.)

Here a complete boot and shoe is produced, having the size and form of sole desired, the sole being of gutta percha, and the improvement consists in preparing and using an electrotype cast in the making of a mould for the production of like sizes and forms of soles of gutta percha, or compounds thereof.

BAUERRICHTER, H., and G. GOTTGETREU. *Improvements in the arrangement or adaptation of stereoscopic apparatus, and in boxes or cases for containing the same.* Dated July 30, 1857. (No. 2078.)

Here the stereoscopic lenses are supported from the end of a frame, the other end of which is provided with a rest for the pictures, and the apparatus thus formed fits into a case, so as not to interfere (or only slightly so) with the internal form of the box, which is also of form to receive the stereoscope without interfering with its other uses, the front or other side of the case being cut to admit of the lenses projecting or being seen even when the box is closed. The inventors also form the stereoscope and box so that the one fits into, and for the time when not in use, forms or appears to form part of the other, without the lenses appearing externally.

EVANS, E., and G. P. ROSKELL. *Improvements in reaping and mowing machines.* Dated July 30, 1857. (No. 2080.)

The inventors employ a series of knives working in a horizontal direction upon a vertical shaft, to which motion is given by bevel wheels driven by the power obtained by the driving wheels of the machine. The knives rest upon feeders or cutting plates forming a surface for the knives to cut. On the vertical shaft rods are placed at intervals, which turn with it, for collecting the corn, &c., and other rods turn in a contrary direction, being placed on another vertical shaft, and pass between them for laying the corn, &c., on the side of the machine.

COOKE, L. *Improvements in machinery or apparatus for preparing cotton, wool, or other fibrous substances to be spun.* Dated July 31, 1857. (No. 2081.)

This relates to what are technically called blowing machines, which are used for opening and cleaning fibrous materials. Under the ordinary beater and feed rollers which work in opposite directions the inventor places one or more small beaters, which revolve in the same direction, but the blades at the working parts pass each other in opposite directions. The cotton, &c., is struck off from the feed roller in the usual manner, and is met by the smaller or additional beaters, and being carried nearly round, is delivered by a roller or rollers, and flexible creeper, upon the original beater again, and delivered in the usual way.

BARLOW, H. B. *Certain improvements in self-acting mules for spinning.* (A communication.) Dated July 31, 1857. (No. 2082.)

This is applicable to those mules in which a cam shaft is employed for producing the requisite changes, and consists in a mode of

communicating motion to the friction pulley that works the cam shaft. The pulleys on the rim shaft are both of the same width, and the friction pulley is put in motion during the going out of the carriage by a click connected to the driving pulley and a ratchet wheel fixed to the loose pulley. When the carriage is out, the strap is moved on to the loose pulley, which then continues to revolve, and the click spring coming against a stud lifts the click clear of the ratchet wheel. By this arrangement, when the carriage goes in it has the full breadth of the strap to start the spindles, and the motions are communicated with more precision than heretofore.

MOLL, I. *An economical fire regulator.* Dated July 31, 1857. (No. 2084.)

This consists of a new system of bars and grates, or in a separate apparatus to be placed on the bars themselves, according to the size of the latter, or even with the grate.

GARNHAM, W. *Improvements in pumping apparatus.* Dated July 31, 1857. (No. 2088.)

These consist in the application of apparatus to the lower end of a pump barrel or rising main, to prevent the entrance to the pumps of any sand, &c., which has a tendency to choke them. The apparatus preferred is two boxes of iron or wood, one placed within the other: both boxes are perforated with holes, and between the boxes the space is filled with any fibrous material, such as straw, cocoa-nut fibre, or hair, and the rising main from the pump is inserted into the inner box, so as to draw the water through the fibrous material.

AVRIL, C. *Improvements in the mode of forming the printing surface of blocks, plates, cylinders, lithographic stones, or other similar bodies made use of for printing in colours.* Dated Aug. 1, 1857. (No. 2092.)

The object here is to give to the printing surface of plates, cylinders, or other similar surfaces from which impressions in one or more colours are to be taken, suitable gradations in the tints in suitable parts of them, and that by printing with two or more of these plates a greater variety of colours and tints of colour are obtained than was possible hitherto with the same number of plates.

COLEMAN, R. *Improvements in implements for ploughing, hoeing, and scarifying land, and in agricultural steam engines used for the traction of such implements.* Dated Aug. 1, 1857. (No. 2093.)

Here the inventor places the hand lever on a fulcrum near the fore part of the machine, and connects it by a link, &c., with an arm or lever fixed on the barrel with which the instruments are connected. He also applies a second hand lever, the short end of which he connects to the first hand lever by a link, &c., which can be hooked or unhooked as required. The second hand lever he causes to act on the first lever when great power is required, an additional leverage being thereby gained, which also brings the first hand lever more within reach of the attendant. The invention also relates to applying steam power to the engines above mentioned, and consists in mounting the engine on a pair of large wheels somewhat near the middle of its length, and so as nearly to balance the whole weight thereon. He also furnishes such engine with leading and trailing wheels, which may be converted into leading or trailing wheels, each pair being furnished with parts whereby they may be used to lead and to steer the machine.

TATLOW, J., and H. HODGKINSON. *Certain improvements in railway breaks and signals.* Dated Aug. 1, 1857. (No. 2095.)

This consists in applying to the locomotive, tender, brake-van, &c., a brake, so that the whole, or a portion, of the weight of such locomotive, tender, or carriage, shall be taken off the wheels, and transferred to a shoe or drag.

RAMAR, A. J. M. *Improvements in ornamental and portable fountains.* Dated Aug. 1, 1857. (No. 2099.)

Here it is proposed that the vessel, to contain the apparatus and the works, should be formed into a pedestal below the basin of the fountain. A double-acting force pump is fixed within the vessel, the piston of which should be constructed with two cups of gutta-percha. At one end of the pump-barrel is fixed an air pipe, the upper end of which enters into an inner vessel, so that the upper end or outlet of the air pipe comes just below the top of the inner vessel. The inner vessel is above the level of the water in the outer vessel, and it has a descending tube, the lower end of which comes to near the bottom of the outer vessel, where there is a valve through which the water and air compass from the inner vessel into the outer vessel. At the other end of the pump is another air pipe, which rises to a position above the water level in the outer vessel. In order to supply water, &c., into the outer vessel there is a pipe descending from near the bottom of the basin into the inner vessel, where there is a valve opening out from the lower end of the pipe; hence, when the pump is put to work it will, according as there is or is not water in the basin, draw water or air through such pipe into the inner vessel,

which in the return stroke of the piston will be forced through the end of the pipe or tube which descends from the inner vessel, from such vessel into the outer vessel. In order to raise the water out of the outer vessel, and above the bottom of the open basin, a pipe (the lower end of which is near the bottom of the outer vessel) rises through the bottom of the basin, and the upper end of such pipe is formed with a stop-cock, and suitably for receiving and having fixed thereon jet pipes or other devices.

GRAY, J. *Certain improvements in doors for furnaces and fire-places.* Dated Aug. 1, 1857. (No. 2102.)

These doors are cast with two vertical chambered spaces extending the entire width of the door. In the innermost recess is placed a fire tile, and in the enclosed chamber, which is formed by the division-plate between the outer recess and the front plate of the door, a water space is formed, openings being made in the top of the water-chamber for the admission of the water and for its evaporation. When the furnace is in operation, the fire tile prevents the radiation from acting directly on the door, and a great amount of heat is passed off by conduction to the water in the chamber. This arrangement greatly decreases the temperature of the door.

DURIEZ, L., jun. *An improved apparatus for stopping horses.* Dated Aug. 4, 1857. (No. 2105.)

This apparatus is applicable to saddle, carriage, or draught horses, and consists of an arrangement of springs, catches, and bands, by means of which the horse can be immediately stopped, the apparatus locking the horse's feet.

BIRCH, R., and R. BRADBURY. *Improvements in machinery and apparatus for clearing and mixing hatters' furs.* Dated Aug. 4, 1857. (No. 2106.)

The documents relating to this invention are with the law officers under objection.

DUMERGUE, E. A. *A new description of fringes.* Dated Aug. 4, 1857. (No. 2107.)

This consists in inserting, during the weaving of lace or braidwork in the open sheds of the warp, tufts, trusses, flocks, or locks of air, or long stapled wool, or fleece, in its entire length or staple, with or without part of the skin or hide left adhering thereto, after which the weft thread is thrown in and beaten up in the usual manner by the slay or batten, by which the lock or truss of wool or hair becomes solidly inserted in the tissue, so that after having cut off the adhering piece of skin or hide the hair or wool remains in its full length, and thus forms the fringe of the lace work. Chenille, gold, silver, coloured thread, &c., may be inserted.

PROVISIONAL PROTECTIONS.

Dated December 21, 1857.

3126. John Hearn Nosworthy, of London, lithographer. An improved apparatus for exhibiting cards, bills, and other like advertisements.

Dated February 6, 1858.

220. Louis Fulgence Candelot, builder, of Paris. Divers anti-nitrous cements, also applicable to rendering damp surfaces impervious, and to flagging and similar purposes.

Dated February 9, 1858.

241. George Pringle, of Prestonpans, North Britain, blacksmith. Improvements in machinery or apparatus for propelling ships or vessels.

Dated March 9, 1858.

476. Henry Deacon, of Widnes, alkali manufacturer. Improvements in purifying alkaline lees.

Dated March 10, 1858.

486. John Fearne Gee, of Wrexham, Denbigh, fire-ware manufacturer. Improvements in the joining of earthenware pipes for drains, sewers, and telegram wire conductors, also suitable for the conveyance of liquids, gas, and steam under pressure, when jointed.

Dated March 11, 1858.

495. Friedrich Ernst Daniel Hast, of Aldermanbury, merchant. An improved mode of manufacturing stearine. A communication.

Dated March 23, 1858.

608. Edward Peters, of Grimsby. Improvements in burning bricks and other articles, made of brick, earth, and clay. A communication.

Dated March 26, 1858.

644. Jean Jacques Theophile Schlœsing and Eugene Rolland, of Paris. Improvements in the manufacture of carbonates of soda.

Dated March 27, 1858.

656. Frederick Bousfield, of Hereford-terrace, De Beauvoir-road, Kingsland. Improvements in apparatus to facilitate the production of duplicate writings.

Dated April 7, 1858.

740. Etienne Pierre Sibille, of Conduit-street, Regent-street. A new apparatus for warming or cooling atmospheric air, water, and all liquids of a similar density to it, warming them to the degree of heat necessary for their transformation into steam.

Dated April 9, 1858.

762. Thomas Greenwood and John Batley, of Leeds, machine-makers. Improvements in machinery for heckling flax and other fibrous materials.

764. Robert McCafferty, of Lancaster, Pennsylvania. Preventing incrustations in steam boilers.

766. George Smith, of Wichampton-street, charcoal manufacturer. Improvements in the manufacture of close stools, night commodes, and water closets.

770. Henry Bauerrichter and Charles Gustavus Gottgetreu, of Charterhouse-square, manufacturers. Improvements in printing in gold, silver, bronze, and other metal, on glass.

Dated April 10, 1858.

772. Asa Lees, of Oldham, machine-maker, and David Schofield, of the same place, manager. Improvements in the construction of carriages for certain machines used in spinning and doubling.

774. Adolphus Neumann, of London. An improved strop for sharpening razors, knives, or other edged instruments.

778. François Auguste Lecornu, of Paris, mechanician. Improvements in drawing and levelling instruments.

780. John Pouncy, of Dorchester, photographer. Improvements in the production of photographic pictures.

782. William Rowett, of Liverpool. Improvements in the construction of electric telegraph cables or ropes.

784. James Rae, of Blackwall, engineer. Improvements in the construction of iron ships.

Dated April 14, 1858.

801. Robert Armstrong, of North Woolwich, civil engineer, and John Galloway, of Manchester, engineer. Improvements in apparatus and furnaces for heating, welding, or melting metals, parts of which improvements are applicable to other furnaces.

803. William Cartwright Holmes and William Hollingshead, of Huddersfield, engineers. Improvements in the manufacture of metal castings.

805. Marc Antoine François Mennons, of Paris. Certain improvements in voltaic batteries. A communication.

807. Thomas Osborne and Robert Alexander Bell, of Derby, engineers. An apparatus for suddenly detaching railway carriages or wagons.

809. Colin Mather, of Salford, machinist, and Henry Charlton, of Manchester, calenderer. Improvements in apparatus for drying cotton, linen, wool, yarn, seed, and other articles.

811. John Henry Johnson, of Lincoln's-inn-fields. Improvements in sewing machines. A communication from S. Comfort, jun.

813. Alfred Vincent Newton, of Chancery-lane. Improvements in rotary pumps. A communication.

Dated April 15, 1858.

815. Francis Preston, of Manchester, mechanical engineer, and William McGregor, of the same place, mechanic. Improvements in machinery for forging and cutting files.

817. Lambert Cowell, of Adelphi, gentleman. An instrument or nippers for cutting the wired, corded, or like fastenings of corked bottles.

819. William Spence, of Chancery-lane. Improvements in the pedestals and journal boxes of railway carriages. A communication from J. C. Geisendorff, of Cincinnati.

821. John Harris, of Woodside, near Darlington, civil engineer, and Thomas Summerson, of Haughton-le-Skerne, near Darlington, ironfounder. An improvement in railway shares.

Dated April 16, 1858.

823. Alfred James Boot, of Manchester, mark-maker. Improvements in machinery or apparatus for making labels.

825. Peter Brotherhood, of Chippenham, Wilts, engineer. Improvements in the construction of locomotive and other steam boilers.

827. George Walker, of Edgbaston, near Birmingham. An improved union apparatus for cleaning and polishing knives and forks, and boots and shoes, and which said apparatus is also applicable for sharpening knives and sharpening or cleaning other articles.

829. Astley Paston Price, of Margate, chemist. Improvements in obtaining cadmium, and certain compounds thereof.

831. John Henry Johnson, of Lincoln's-inn-fields. Improvements in preparing printing surfaces. A communication from J. McElheran, of Brooklyn.

Dated April 17, 1858.

833. Eugène François Sans, of Epernay, France, engineer. Apparatus serving to measure upon a large scale the smallest pressions of any fluid matters.

835. Adolphe André Lutereau, of Paris, engraver. The purpose, by machinery, to polish wholly or partly leather paper-hanging, and all other febril stuff; that is to say, that a piece can be polished in several parts, having spaces unpolished.

837. David Chalmers, of Manchester, machinist, and John Theophilus Swallow, of the same place, cotton-waste dealer. Improvements in looms.

839. John Richard Chirm, jun., of Birmingham, auctioneer. A new or improved chimney pot or top.

845. John Henry Johnson, of Lincoln's-inn-fields. Improvements in sewing machines. A communication.

847. William Latham, of Russell-court, Drury-lane. Improvements in the manufacture of hats and caps.

Dated April 19, 1858.

849. Marcus Brown Westhead, of Manchester, merchant, and Hugh Baines, of the same place, gentleman. Certain improvements in machinery or apparatus for the prevention of accidents, applicable to hoisting and other lifting machines employed in connection with railways or other places where heavy bodies require to be moved from one level to another.

851. William H. Ridgway, of Hanley, Staffordshire. Improved apparatus for opening the covers of jugs.

853. James Howorth, of Farnworth, Lancaster, tinplate worker. Improved apparatus to facilitate the discharge of smoke and prevent its return, which said apparatus is also applicable for the ventilation of buildings.

855. Michael Henry, of Fleet-street. Improvements in the manufacture of candles, and in preparing materials for the same, and in apparatus employed therein. A communication from P. A. de Gemini.

857. Edward Killwick Calver, of Sunderland, master in the Royal Navy. Improvements in the formation of harbours of refuge, which improvements are also applicable as a wave screen in other situations.

859. William Clark, of Chancery-lane. A new instrument for taking the altitude of the sun, to be termed the helypsometer. A communication.

Dated April 20, 1858.

861. John Whiteley, of Stapleford, Nottingham, lace manufacturer. An improvement in machinery for the manufacture of looped fabrics.

865. George Finlayson, of Gighty Burn, Forfar, millwright. Improvements in machinery or apparatus for sowing or depositing seeds in land.

867. Daniel Moore, of Brooklyn, United States. An improvement in fire tongs.

869. James Rawstorne, of Abingdon Villas, Kensington, Captain in the Royal Navy. Improved means for stopping or retarding the progress of ships or vessels.

Dated April 21, 1858.

871. Alexander Ogilvie, machinist, of Denmark-street, Soho-square, and John Richardson, drying machine manufacturer, of New Oxford-street. Improvements in apparatus for working steam engines.

873. Maria Ross, of Gallowtreegate, Leicester. Improvements in the manufacture of frames for looking-glasses, pictures, and other representations.

875. William Henry Fox Talbot, of Lacock Abbey, Wilts, Esq. Improvements in the art of engraving.

877. Edward Green and Edward Green, jun., both of Wakefield, engineers. Improvements in apparatuses for generating and superheating steam, and for heating.

879. Benjamin Parker, of Clapham and Millwall, Improvements in the permanent way of railways.

PATENTS APPLIED FOR WITH COMPLETE SPECIFICATIONS.

886. George Gilmour, of Massachusetts. A new and useful or improved messenger shackle block. Dated 22d April, 1858.

919. Aaron Faulkner Emery, of Massachusetts. A new and useful or improved machine for sewing cloth or other material. A communication from William M. Horn. Dated 26th April, 1858.

930. James Henry Bennett, engineer, of Vamburgh-place, Leith. An improved arrangement of safety valves for steam, gas, or any aireform of liquid body. Dated 27th April, 1858.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," May* 4, 1858.)

3136. W. Basford. Improvements in the manufacture of gas, and in retorts and other apparatus to be used therein.

3151. J. Moss, T. Gamble, and J. Gamble. An improvement in the manufacture of cast steel hoops and cylinders.

3161. G. Burley. Improvements in apparatus for cutting the pile of fustians and other pile fabrics.

3168. A. Bruce. Improvements in watches and time pieces.

3169. J. Barling. An improved paddle for propulsion on water.

3178. T. Spencer. Improvements in the purification of illuminating or lighting gas.

3190. J. O'Neill. Improvements in an apparatus for communicating betwixt the guard or passengers and the engine driver on railway trains.

35. R. A. Brooman. A method of and apparatus for teaching music and arithmetic. A communication.

39. W. Church. Improvements in measuring rules, compasses, and other mathematical instruments, and in machinery to be employed in manufacturing measuring rules and other mathematical instruments.

59. N. E. Jeanroy. Improvements in the manufacture of net lace.

125. C. F. Vasserot. A single and double acting machine with electro magnetic-motive power. A communication.

134. A. Wall. An improved lubricator for the moving parts of machinery.

244. B. B. Wells. Improvements in apparatus for counting and indicating numbers.

264. W. N. Wilson. Improvements in machines for cleaning and polishing knives. A communication.

403. H. M. Platt. Improvements in ploughing and tilling land.

413. A. V. Newton. An improvement in the process of manufacturing soda and potash. A communication.

421. W. Scoble. Arranging the retorts, furnaces, flues, communications, and connections, for the more economical manufacture of gas, and by which arrangement the generative heat may be obtained from either coal, coke, tar, or other similar combustible substances.

616. M. A. F. Mennons. Certain improvements in the construction of heating apparatus. A communication.

644. J. J. T. Schloesing and E. Rolland. Improvements in the manufacture of carbonates of soda.

747. G. W. Baker. Improved signal apparatus to be applied to railways.

748. W. Nimmo. Improvements in the manufacture of printed woven fabrics.

762. T. Greenwood and J. Batley. Improvements in machinery for heckling flax and other fibrous materials.

805. M. A. F. Mennons. Certain improvements in voltaic batteries. A communication.

810. W. Spence. Improvements in the pedestals and journal boxes of railway carriages. A communication.

829. A. P. Price. Improvements in obtaining cadmium, and certain compounds thereof.

841. M. A. F. Mennons. A certain medicinal compound for the treatment of epilepsy. A communication.

842. M. A. F. Mennons. An improved system of portable tents for military and other purposes. A communication.

843. M. A. F. Mennons. An improved substitute for the pulverised cotton and wool employed in the manufacture of felted tissues, papers, and other fabrics. A communication.

845. J. H. Johnson. Improvements in sewing machines. A communication.

857. E. K. Calver. Improvements in the formation of harbours of refuge, which improvements are also applicable as a wave screen in other situations.

865. G. Finlayson. Improvements in machinery or apparatus for sowing or depositing seeds in land.

886. G. Gilmour. A new and useful or improved messenger shackle block.

919. A. F. Emery. A new and useful or improved machine for sewing cloth or other material. A communication.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

962. William Elliot Carrett.
963. James Marsh.
969. Henry Francis.
970. Pierre Dépierre.
975. William Hartley.
979. William Banks, Henry Hampson, and John Banks.
984. Frederick William Harrold.
986. Henry Lee, jun., and John Gilbert.
988. Mario Amédie Charles Mellier.
998. Joseph Lacassagne and Rodolphe Thiers.
1133. Frederick William Mowbray.

LIST OF SEALED PATENTS.

Sealed April 30th, 1858.

2758. William Shields.
2760. Joseph Davy.

2764. Malcolm Stodart.
2784. James Apperly and William Clissold.
2788. James Mallison, jun.
2793. Rudolph Wappenstein.
2796. John Seithen.
2805. Joseph Miller.
2806. Godwin Ratler Simpson and David Caldow Simpson.
2810. Henry Beinhauer.
2814. Henry Robinson Palmer.
2817. Germain Canouil.
2824. John Adams.
2834. William Jekin Elwin.
2844. Henry Thompson and Samuel Thompson.
2868. Michael Henry.
2908. David Melvin.
3015. Charles Westendarp, jun.
3196. Peter William Barlow.
122. William Weild.
437. William Thompson.

Sealed May 4th, 1858.

2816. Robert Ker Aitchison.
2821. Hugh Baines.
2822. John Fordred.
2842. Josiah Harrington.
2848. Isaac Taylor.
2856. William Picking.
2925. Gerd Jacob Bensen.
2977. Charles Goodyear.
3098. John James Davis.
3200. James Long.
18. George Edward Dering.
135. George Edward Dering.
351. William McLennan.
416. Willem Henderk's Sleeboom.
507. Luigi Ferrari Corbelli.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICE TO CORRESPONDENTS.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

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Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London, E.C.

RIGGS' PATENT IMPROVEMENTS IN PREPARING, SAWING, PLANING, AND GROOVING WOOD, ETC.

Fig. 2.

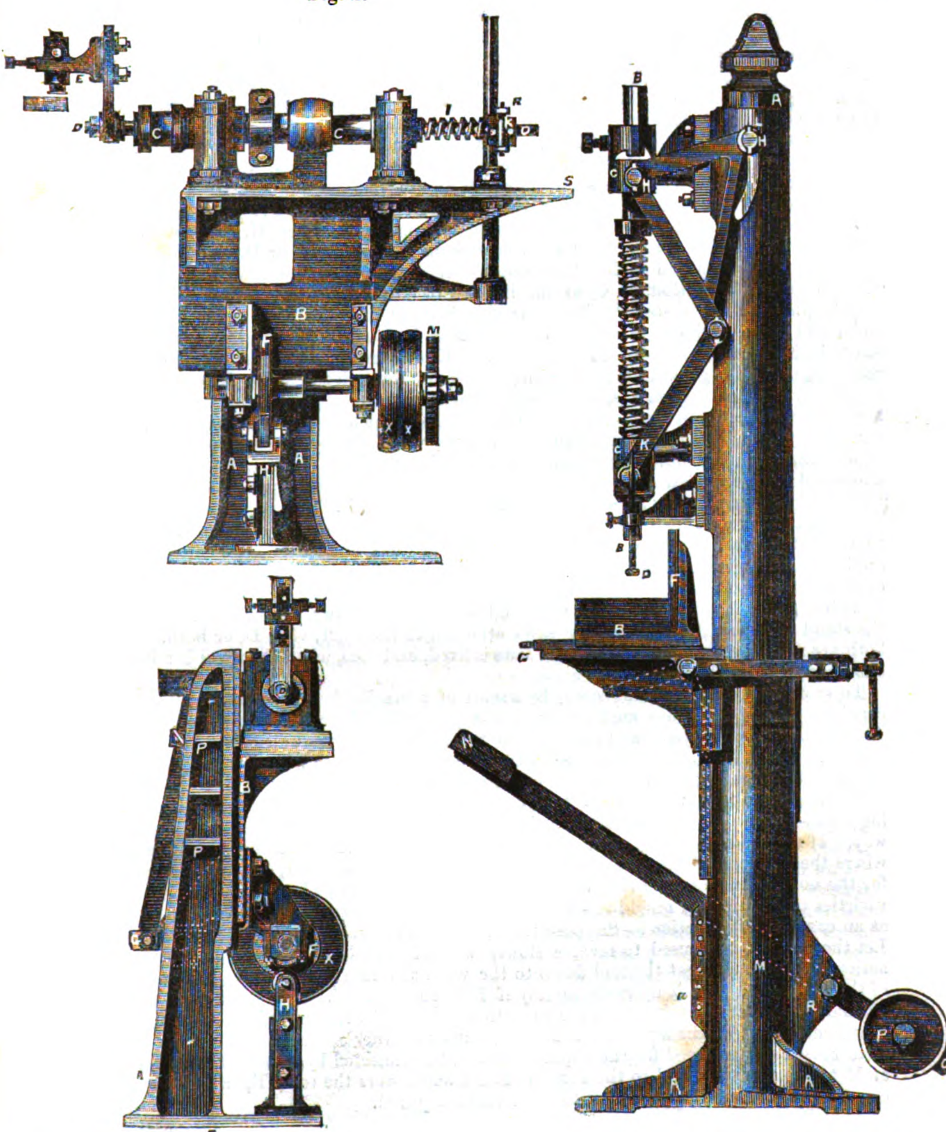


Fig. 1. Fig. 3.

RIGGS' PATENT IMPROVEMENTS IN PREPARING, SAWING, PLANING, AND GROOVING WOOD, ETC.

MESSRS. A. RIGG, sen., and A. RIGG, jun., of Chester, have patented the following improvements designed to effect the above objects. For preparing wood for purposes where dry and well-seasoned timber is required, close chambers are formed, and provision made so that the wood may be arranged with open spaces between the pieces; one or more inlets and outlets are provided in these chambers for the admission and exit of steam or heated air, which are to be admitted alternately or together. They prefer the admission of them alternately, so that after the timber has been partially dried they expose it to an atmosphere of steam, and then to currents of heated air caused to enter by a fan or other means. It is well known that timber dried when exposed to the alternate action of wind with heat and showers is most valued; the patentees by this mode of action adopt as nearly as may be a similar process. In the case of some timbers it may be desirable to utilize the product by the condensation of such of the volatile products as may be extracted; in such cases they arrange any ordinary means for the condensation of the vapours as they pass out from the chamber.

Fig. 1 is an end elevation, and Fig. 2 a side elevation of a machine for sawing, planing, moulding, and ornamenting mouldings. A is a stand or frame, upon which is applied the slide, B, carrying bearings for a shaft, C, which may be hollow and contain a spindle, D. At F is a cam for raising or lowering the slide when required. The adjustment of the slide to its work can be effected by the stand and moveable piece, H. G is a crank or other contrivance for causing the tool or cutters on the spindle, C or D, or both, to oscillate through any required angle. The tool holder or cutter on the spindle, D, can be set at any distance from that on C, so that if a saw or cutter be attached to each shaft they may be placed at any distance. The internal shaft, D, may be acted upon either by a collar and links, as shown in elevation in Fig. 2, or by a cam. The spring, I, around the shaft, D, is to keep this shaft against the collar, K, or cam, *a*, as the case may be. When required, motion is given to the collar, K, or cam, *a*, through the shaft, L, or through a spindle by any ordinary means, with change wheels intervening between it and the means for producing the motion of the wood. On the shaft which carries the cam, F, are a fast and loose pulley, X; also, when required, a spur wheel, M, by means of which the cam, F, and crank, G, can have movement communicated thereto. In Fig. 2 the tool holder and wood to be operated upon are shown at E; the wood may be supported and advanced by any of the ordinary means which give regular motion. P, P, P, P, are faces formed in the upright or frame, A, to admit of the attachment of brackets for the support of tables to carry the wood to be operated upon. Boring tools or face or edge cutters may be applied to the spindle, D, and a face cam or other instrument attached to the other end of the same spindle to give an end motion to it.

Action of the Machine.—To saw the wood with circular saws, the slide, B, is bolted to the stand or frame, A, and a saw or saws attached to the shaft, C or D, or both. When both are used the distance between the saws is fixed, and thus, when the wood is advanced, one or more breadths may be cut.

To saw wood with vibrating saws, by means of a bracket bolted to the stand, a table, capable of being set at any angle, is fixed at a proper height above the axle of the saw. Above this table is a guide and spring, and to the slide in the guide the upper end of a vibrating saw is fixed. The lower end of the same saw is fixed to a similar guide below the table, and motion is given to it from a crank or eccentric on the saw axle.

To form plain mouldings, attach to C or D a tool shaped to correspond with the moulding required; the wood may then be advanced, and the moulding formed in the ordinary way. If required, a tool may be attached to each shaft, C and D. In this and other cases, where the elasticity of the shaft might affect the truth of the work, a bearing is provided for the nose or outer end of the shaft, D. This bearing is not shown. There are many varieties of ornamented mouldings which the machine can form. The following is taken as an example of its action:—Suppose the mould is to be ornamented with parts of a circle. Let the cam, F, be caused to revolve slowly while the tool, E, oscillates rapidly. The action of F will thus set the tool down to the work at a rate proportioned to the quality of the wood, and raise it up again rapidly if F is so arranged. The wood may then be advanced, another cut taken, and the operation proceeded with as before. Again, if the ornamented part be not a portion of a circle, but some other curve, let the cam, F (whose form must be determined for the required curve), be connected by means of change wheels at M to the crank, G, and so the cam, F, raises and lowers the tool, E, while the crank causes it to oscillate, and thus produce the curve required.

The machine for mortising wood is shown in Fig, 3, a side elevation. A, A, is a pillar; B, B, is a shaft moving in the guides, C, C, and provided with means for holding a tool at the lower end; D, D, (one only is represented) are stops to hold the wood down, whilst the mortising tool is being withdrawn; E, is a table for supporting the wood, and carrying a back upright, F, which, by means of a screw (the end of which is shown at G), can be adjusted to a required distance from the tool. The table, E, can be fixed by any of the usual means at a proper distance below the tools; H, I, and I, K, are links, of which there are two sets, one set on each side of the rod, B, B; the upper end of H is jointed to the fixed piece, C, and the lower end, K, is jointed to the moveable bar, B, B, which carries the tool, H, I; and L, I are arms rigidly joined to the link, H, I; at L is a joint, connecting H, L, I, with the bar, L, M; the lower end of L, M, is connected with the foot lever, N, O, whose fulcrum is at R; at P, is a counterpoise weight. The wood to be mortised is placed on the table, E, and a tool is placed in B, B; when the foot depresses the lever, N, O, the link, L, H, I, and the corresponding one on the other side, are depressed. These lower the end, K, and, consequently, depress the tool in B, B, and cause it to enter the wood. The spring coiled round the shaft, B, B, together with the counterpoise, P, operate to withdraw the tool from the wood. *a*, *a*, is a series of holes through which a pin may be passed, to allow the rise of the foot lever being varied.

The patentees also give a description of a shoe that may be applied when face or edge cutters are used.

IRON: ITS COMMERCE AND APPLICATION TO STAPLE MANUFACTURES.

BY CHARLES SANDERSON, ESQ.*

In the reduction of iron ores, it is very important to obtain the resulting metal in a state as free from deleterious matter as possible. To effect this, the ore is roasted to disengage all volatile matter and disintegrate the mass, such fluxes being used as shall, in the process of smelting, form vitreous compounds, by entering into combination with the earthy matter contained in the ore and fuel. Since a certain amount of alkali is required to saturate the silicious matter, that object would be best attained by introducing such alkali in as condensed a form as possible. I am therefore a strong advocate for the use of caustic lime instead of limestone, because the carbonic acid, which forms 40 per cent. of the bulk, is not wanted, and it is a waste of fuel to heat so large a mass of what may be called sterile material. Salt has been proposed as a flux, and in small doses will be found very beneficial.

SIR FRANCIS KNOWLES' IMPROVEMENTS.

Sir Francis Charles Knowles, struck with the functions of the cyanide of potassium, proposes to introduce potash, felspar, or soda into the furnace charges; he adds lime, equal to two-thirds of the weight of the silica contained in the felspar; the bases then become lime, alumina, and the alkali, which being in excess, is released to form the cyanide required; he states that his trials have given him a cinder entirely free from iron; he has also patented the use of kaolin or china clay as a flux; this substance consists of 47 per cent. alumina, and 52 per cent. silica, so that even when the silica is neutralised there yet remains 30 per cent. of alumina to act upon that contained in the ore; kaolin is thus much superior to shale, which only leaves about 10 per cent. of free alumina after the silica is neutralised. I believe some experiments are now going on to smelt forge cinders with kaolin, and, if they are successful, this substance may be beneficially applied to all silicious ores. He further proposes to deoxidize the rich ores prior to their being charged into blast furnace, by charging them into large retorts heated cherry red, and passing through them a current of hydrogen gas, which he obtains from the coke ovens; he finds that peroxides can be thus converted into protoxides in two hours, and that in three or four hours they assume the appearance of metallic iron; ore so prepared, he states, will at once go down as grey iron on arriving at the boshes; as an economical means of carbonising the ore, he takes the waste gases of the furnace and passes them in a highly heated state through the fuel to be coked; the gases evolved are stored in a gasometer for use.

HOT AND COLD BLAST IRON.

There has been much controversy as respects the relative strength of hot and cold blast iron; I do not propose to give at length the reasons alleged by the supporters

* Abridged from a paper read at the Society of Arts, May 5th, 1858.

of the superiority of either kind; but I wish to observe that, inasmuch as iron becomes stronger in proportion as the metallic molecules of which it is composed are brought closer together, it appears to me most probable that pig-iron produced by cold blast, and under such circumstances as to ensure the production of the purest iron, would be most likely to produce the strongest material for casting purposes. With this theory, as regards the strength of iron, I must at present leave this most important matter.

IMPROVED REFINED METAL.

The present plan for producing refined metal is very costly, averaging 15*s.* when pig iron cost 70*s.* per ton. This becomes a serious charge upon the metal in its earliest stages of manufacture; and, although malleable iron made from refined metal is much superior to that made from pig iron, yet owing to the great expense of refining by the usual process of a strong blast, together with the waste experienced, and cost of fuel and labour, the prime cost of the finished bar becomes so seriously affected as to prevent its general use. I have devoted considerable time and expense to this desirable object, and I have succeeded in producing a highly decarbonised refined metal, at a cost not exceeding 5*s.* to 6*s.* per ton, including waste and every other expense. This metal produces a puddled bar with a waste of only 1½ cwt. per ton upon very common iron, and as low as 1 cwt. per ton, if the refined metal be made from strong forge pig iron. Upon a calculation, based on the manufacture of 100 tons of Welsh iron, remelted from the pig, ⅓ being white iron, and ⅔ mottled pig, the waste in refining was 90 lbs. per ton, and upon a quantity of 60 tons, drawn directly from the blast furnace in a fluid state into my refining furnace, a loss of only 60 lbs. per ton was experienced. Two furnaces in one of the large Welsh iron works puddled this refined metal for twelve consecutive days, and the average waste during that period was only 84 lbs. per ton; the pig from which this iron was made had no cinder in its composition. The objects of this process are to reduce the loss of metal, and to use coal instead of coke as a fuel; to effect a uniform decarbonisation of the pig iron without the use of blast, to use a chemical reagent capable of giving out oxygen during its decomposition, which, taking up and uniting with the carbon evolved from the metal, produces carbonic oxide gas, and this, acting upon the earthly compounds contained in the pig iron, precipitates the metal contained in them, by which means I obtain very clean, pure, crystalline metal, capable of being manufactured into superior malleable iron. Several tons of the refined metal were puddled in Yorkshire and rolled into rivet iron, which was used for rivets in the *Leviathan* steamship, and reported of excellent quality. This iron when finished experienced a waste of only 3½ cwt. per ton. By this process I refined a mixture of 15 cwt. of number 3 hot-blast pig, and 6 cwt. of cold-blast charcoal iron; the metal was puddled and rolled directly into a bar, then converted and melted into cast steel. This quality of iron is somewhat expensive, but it is the purest iron which can be produced, having been melted and thus divested of all its foreign matter. It is a proof also of the great additional strength which iron acquires when the metallic particles are made to approach close to each other. My refined metal has been successfully tested for tin plates. There are samples of this iron made in the puddling furnace, and refined with charcoal; in both instances the waste was reduced one-half when compared with pig iron. The tin plates manufactured from it are reported of good quality. The metal has also been found equal in quality to charcoal pig iron when used for the manufacture of very common cutlery, called run steel. The articles before you will show that it admits of being hardened and tempered.

CAST STEEL AND WROUGHT IRON ORDNANCE.

Much has been advanced in favour of the manufacture of ordnance from cast-steel. I do not think that good and serviceable pieces of artillery can be manufactured from such metal. There is no great practical difficulty in casting a mass of steel 2 or even 3 tons weight, but the irregular crystallization of so large a body of steel, melted in parcels of 50 lbs. in a crucible, is unfavourable to that uniform molecular structure which such castings should possess, since upon their excellence often depends the issue of a siege or action.

Although wrought-iron ordnance cannot be depended upon, they are better than cast steel, but their perfection is much impaired by the necessity of piling masses of iron together. I admit that a weld can be perfectly made, but two surfaces when oxidized can never become one amalgamated body, without the oxygen be reduced at the moment when the union is effected. Wrought-iron guns have given excellent results when fired at slow intervals, but if a continuous quick firing were kept up, I doubt their being able to withstand the

shocks; they would, I think, after each round, become gradually weaker throughout the welded surfaces.*

COMBINED IRON AND STEEL STRUCTURES.

It appears of very great importance that some means should be devised for producing a material combining the greatest strength with durability, not only for the construction of rails, but also for tubular bridges, steamships, and a great variety of similar purposes, not only to prevent loss of life, but also to secure an eventual economy. No plan appears so effective as that obtained by the union of iron and steel; such a compound metal will, I believe, furnish a better and a cheaper means of effecting this great object than by the use of iron alone. Large masses may easily be obtained through the medium of the welding property of cast steel in a fluid state. A bloom of iron is heated white hot, placed in a cast-iron mould, and fluid steel is poured against it; the effect is, that the carbon of the steel reduces the oxide on the surface of the iron, and a union like that of silver plated on copper is obtained, rather than a common weld. Two pieces of iron may thus be united, by pouring cast steel between them when heated, forming a mass of great strength, and useful in machinery, where considerable strain is exerted, on account of the stiffness and strength of the steel being united with the toughness of the iron.

A NEW RAIL FOR RAILWAYS.

I beg to submit to your notice a new form of rail. It is made from a thick plate of iron and steel united as described. The plate, when hot, is bent up into the form of a rail—the steel coating being outside—before the bar is cold; it is hardened by being plunged into cold water, and tempered in the usual way. By these means are obtained, not only great combined strength by the union of the two metals, but a further addition of it, equal to 33 per cent., is made by hardening and tempering the steel, which not only prevents the running surface from rapid wear, but what is of the greatest importance, such rails can never laminate—the elasticity acquired by the hardened and tempered steel portion of the rails will prevent them from setting when bent by sudden and undue pressure; they can be made of any thickness, according to the nature of the traffic. The main line might be laid with rails like the thicker model, which is equal in strength to the double-headed rail now used, which weighs 84 lbs. per yard; but many districts might only require rails like the lighter model. The advantages this rail presents are, great strength, great resistance under undue pressure, a hard-non-laminating surface, which will wear very much longer than those now used; but the most prominent value is their extreme lightness, combined as it is with great strength, which becomes of such high importance in the first cost of a railway.

TUBULAR BRIDGES AND STEAM SHIPS.

I propose the use of iron and steel united in a bloom, and subsequently rolled to a sheet, hardened and tempered in order to obtain the maximum amount of rigidity combined with strength, as a material for the formation of steam ships; and it will be found equally useful in the erection of tubular bridges, and many other engineering purposes. In these days of steam navigation, I would request of those who are engaged in building iron steam-ships to investigate the usefulness of such material, and to inquire into its cost. No doubt it may be expected to be expensive. I am enabled to state, however, that it can be produced at a sufficiently low price to ensure its use; and whatever increase there may be in cost will be more than compensated for by the difference of weight required of this material contrasted with that of iron.

PUDDLED STEEL.

The value of puddled steel has recently been brought under your notice. I can add little to the opinion I then expressed. The process will certainly produce steel, but from the nature of the operation itself it must be evident that the quality is continually subject to great irregularity. All agree that the greatest care is necessary to produce it. More uniformity may be obtained by breaking up the rough bars, selecting them when cold, and welding them together. Still the mass is simply steel combined with fine fibres of iron intimately intermixed. It will become a useful metal for a great variety of purposes where a cutting edge is not required. But, looking at puddled steel as a raw material to be manufactured by the peculiar process which has been described in the patent, I still think that, if refined metal were puddled, shingled, and rolled to a bar, and then converted into steel by the usual process, a cheaper and more uniform material would be

* Mr. Anderson, of Woolwich Arsenal, subsequently stated that although one splendid specimen of manufacture of that description had been made at the Mersey works, under Mr. Clay, yet he did not think much was to be said as to the likelihood of wrought iron ordnance being employed to any extent.

obtained. I take this opportunity of repeating that the conversion of bar-iron into steel ought not to cost more than 18*s.* per ton. My calculation is drawn from careful accounts kept of the working of ten converting furnaces for five years.

CAST STEEL.

For some time past our scientific journals have been filled with various projects for the production of steel, especially cast-steel, at very cheap rates. After all the apparently feasible projects which have been suggested, nothing of any importance has yet been done to attain this object. Although I do not think that a process is yet discovered which secures the minimum cost price of the production of such material, yet this inquiry is going forward, and will, doubtless, be speedily arrived at. Whether such discovery emanate from existing steel-makers or from others not engaged in this trade, its production at a cheap rate will confer the greatest benefit, not only upon our railroad requirements, but also upon our steam navigation; we may then hope to have better and more efficient rails, stronger bridges, and safer steam-ships.

THE BESSEMER PROCESS.

As regards the direct conversion of pig-iron into malleable iron or steel without the pudling furnace or charcoal refinery, I have already expressed a strong opinion, when that process was first proposed at the Meeting of the British Association, at Cheltenham.* I still see no cause to change the opinion I then expressed, that neither practically usefully malleable iron nor cast steel could be produced directly from pig-iron.

MR. ROBERT MUSHET'S PROCESS.

When it was found that the decarbonized pig-iron, resulting from the process of blowing a strong blast of air into a body of fluid iron, would not roll or draw under the hammer, Mr. Robert Mushet patented several processes with a view of rendering this product malleable: manganese mixed with carbonaceous matter is suggested by him as a means of obtaining malleability. He asserts that he can operate upon one or twenty tons of fluid metal, by blowing a strong blast into it, and when by this means it is decarbonized by adding from 2 to 20 per cent of manganese and carbon, he professes to change a brittle metal into one capable of being rolled or hammered, hardened and tempered.

MONSIEUR CHENOT'S PROCESS.

Patents have also been taken for the production of cast steel from iron ore. Many experiments have also been tried, both in England and France, to produce a cheap steel from such an inexpensive material. By Monsieur Chenot's process the iron is separated from other deleterious matter by an electro-magnetic machine; to the material so obtained a thick lime water is added, to prevent the particles sticking together and forming a compact mass during the process of deoxidation, which is performed in small perforated iron vessels, by passing through it a current of carbonic oxide gas. This deoxidized spongy mass is then steeped in any kind of fatty matter. From this source he says he obtains the constituents of steel. He proposes also to condense the spongy matter by pressure, and submit it to the usual process of cementation; it is then to be melted into cast steel.

There has been much said respecting a process for producing cast steel from a mixture of spathose iron ore and granulated cast iron; but I think no successful or practical result will be obtained.

FURTHER IMPROVEMENTS OF SIR FRANCIS KNOWLES.

Sir Francis Knowles has also patented a process for making cast steel from iron ore. He says, that if the complete success of the process be doubted, it is impossible to deny that it rests upon a theory both rational and consistent with chemistry. He looks upon the manufacture of cast steel from British materials as of national importance, by rendering us independent of Sweden or any other country. There is before you a complete set of samples of this steel, also a variety of manufactured articles, from which you can judge of the progress which he has made. His theory is as follows:—If the oxides of iron be placed in a closed retort or crucible in contact with charcoal, and submitted to adequate heat, the metallic part, as soon as it is deoxidized by the charcoal, begins to absorb carbon, and is, in fact, converted; if, then, no more charcoal be admitted than is exactly sufficient to deoxidize the ore and to convert the metal to the required temper, it is plain that the absorption of carbon will then cease; and if at this stage the heat be gradually raised to the steel melting point, the production of steel must be the inevitable consequence. In sending the examples I am enabled to exhibit, he observes, in order to adjust the charcoal we must know how much metal there is in the ore, and what is its state of oxidation: preliminary chemical analysis will settle this point. The next step is so to adjust the fluxes that protosili-

* See *Mechanics' Magazine*, Vol. 65, No. 1728, p. 149.

cate of iron may not be produced; and for this purpose chemistry must determine what earths are contained in the ore and the fluxes. A calculation must then be made, so that the aggregate may be a combination of the silicates of alumina, lime, magnesia, and the potash of the charcoal used. Magnesian dolomite calcined is preferable; in its absence ash of the charcoal may be used. The other flux he uses is kaolin, which is so rich in alumina: there is an additional value in this, as it prevents the corrosion of the pots when in proper quantity. The best ratio of the earths is three silica, two alumina, two lime: samples of the cinder are here for inspection, being pure and free from protoxide of iron. The most striking feature of this "ore steel" is its very great density. This he ascribes to the total absence of the protosilicate of iron in the cinder. Amongst the articles is a chisel taken from an ingot; merely ground, hardened, and tempered, it has cut to pieces a bar of file steel. This striking property has led to its employment for the cogs of wheels and other important purposes. He also uses the Greenland cryolite and cyanides of sodium and potassium as fluxes. He has also contrived a furnace or cupola for making steel by this process. It resembles an ordinary blast furnace, except that the materials, mixed in proper proportions, are carefully excluded from the fuel, and descend through a long pipe of refractory fire-clay, and through the various degrees of heat required, to the hearth of the crucible. Whether steel can be directly cast into ingots from such a furnace is at present doubtful; but there cannot be a doubt that a steel metal will be obtained. Sir Francis Knowles does not disuse altogether the present method of conversion; on the contrary, his opinion is, that, for certain purposes, it is the best and most economical, as for some of the milder tempers—but whenever the operation of melting is required at an intermediate stage, there he would substitute the direct method, and, above all, for cutting tools of every description, and the highest class of cutlery. Such is Sir Francis's own statement.

The foregoing are the prominent processes which have recently attracted public notice, having for their object a reduction of the prime cost of making cast steel.

REMARKS ON THE PRODUCTION OF CHEAP STEEL.

As regards all steel produced by the decarbonisation of crude iron—if we examine the peculiar state of this metal it will be found, that the mass is composed of atoms irregularly decarbonised and impure; besides which, we find in such masses of metal a variety of combinations, all of which are opposed to malleability, because the aggregated molecules of such mass are not homogeneous, but are mixtures of metal existing under different chemical circumstances, which give to each molecule a different crystalline structure, so that, when heated, they expand unequally. All these opposite and conflicting states, in which decarbonised pig-iron is found, prevent the mass from drawing or rolling. If lumps of iron are drawn from the puddling furnace a little before the mass is balled up, a bright and crystalline metal is obtained, similar to this decarbonised crude iron; it is partially malleable, but it has no fibre to recommend it as an iron, nor has it carbon to entitle it to be called steel. Mr. Mushet has evidently the idea that the addition of his compound will produce one uniform crystallisation, favourable to malleability, and he appears to expect that an alloy will be found of metallic manganese with the iron, but analysis has shown that no such alloy does take place. Manganese, added to steel, in the crucible acts simply as a detergent; it cedes its oxygen to the silex, which the silicates of the metal may contain, and oxydises it; a union then takes place, producing a silicated oxide of manganese, in the form of a glassy slag; the metal becomes thus purified, because all foreign matter is separated, forming new compounds, which cannot again unite with it. In any attempt to produce cast steel from decarbonised pig-iron, it must be broken up when cold, and such reactives added to it when charged into the crucible as shall take up the deleterious matter and liberate the metal, which must be kept in a fluid state for a long time, until every particle is reduced to the same chemical condition, and thus rendered more favourable for malleability; but this is so nice an operation, and so dependant upon uncontrollable circumstances, that it is not reducible to practice.

As regards all those processes which have for their object the manufacture of cast steel from iron ore, I may in part advance the above theory against their success, but there is another cause which operates very unfavourably. Iron ore may be deoxidised and used as M. Chenot proposes, or it may be charged into a crucible along with carbonaceous matter and fluxes, and slowly heated until deoxidation takes place; when the cementation is complete, a mass is obtained in the crucible consisting of earthy matter intimately mixed with steelified metallic particles, all which have to be melted down into one mass. I think no

one can reasonably assume that all these metallic particles, intimately mixed as they are with the earthy matter, can be in the same chemical condition; nevertheless the metal must all be melted down in this imperfect state; the metallic part more or less carbonised and mixed with foreign matter falls to the bottom of the crucible, simply from its superior specific gravity; in order to give every chance for the matter to clear itself and become uniform, it might be kept in a melted state for some time, but for all this the operation carries with it no certainty either as regards quality or temper. I manufactured a ton of ingots from a very pure black oxide of iron; using every possible care, not more than 7 cwt. could be drawn into bars at all, and the fracture was very irregular, which may be observed in the sample; a part of this steel would not draw, but broke in pieces; the rest drew more or less imperfectly, and, on a careful examination, I found it very evident that the chemical condition of the metallic particles was so dissimilar that malleability could not be depended upon. In order or as far as possible to prove this assumed case of irregular malleability, I took soft steel in one crucible and very hard steel in another, and mixed with each a quantity of earthy matter, as nearly as possible to imitate the condition of the iron ore when melted; when they were completely melted they were intimately mixed together, and an ingot was cast; but although very carefully heated it would not draw; this was not because any earthy matter was mixed up with the metal, but because its carbonization was variable throughout the mass, which gave rise to such a confused diversity of crystallization, and caused so great a difference in the degree of malleability of the atomic structure of the mass, that the action of the hammer at once broke up the ingot; the want of tenacity or disaggregation of the mass is often seen in large ingots, although made from good material; this is caused either from the irregular temper of the steel used, or from its having undergone a complete change in the crucible by over heating it, and thus causing a mixed crystallization; or it may equally arise from being under-melted, which it is evident would produce the same effect. As I have stated, ingots of cast-steel can be produced directly from iron ore, but the best portions harden very irregularly, whilst the mass is usually so imperfect as to be unmerchantable. I admit that a cheap metal may be produced, but, as I have shown that there is no certain result to be obtained in its manufacture, so also there is no economy. I will not assume that those who have been so sanguine in the production of cheap steel can have expected to produce a superior quality suitable for the best purposes; I cannot suppose such to have been their object, but rather to obtain a cheap material in a fluid state, capable of being cast into large masses for engineering purposes, or objects which are now manufactured from malleable iron—such as shafts, beams, girders, plates for ships' bridges, &c., &c. In a commercial point of view, England is the only exporting country to any extent.

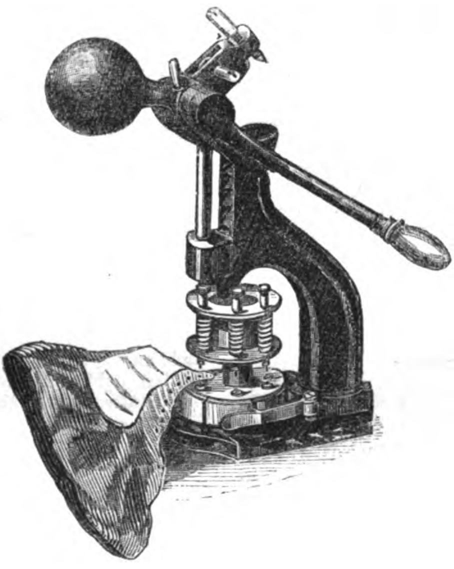
CLAUDET'S STEREOMONOSCOPE.

We learn from the "Athenæum" that Mr. Claudet has presented to the Royal Society a new optical instrument of his invention, called the Stereomonoscope, by which a single picture produces the stereoscopic illusion. The centre of a large black screen is filled with a square of ground glass, upon which is thrown a magnified photographic picture. On looking at this picture without the help of any optical instrument, we see it in perfect relief, as when we look at two different pictures through a stereoscope. It is not necessary to be at a fixed distance, and it may be examined as an ordinary picture without the least fatigue to the eyes. Although enlarged by the instrument, it may be magnified still more by using large convex lenses. Two or three persons may examine the picture at the same time with ease. Mr. Claudet by this discovery has solved a problem which has always been considered an impossibility by scientific men, for the stereoscope by its very name must sound like a paradox to the ears of all versed in the principles of binocular vision. The new fact is, that the image on the ground glass of the camera-obscura produces the illusion of relief. This does not take place if the image is received on paper. When the medium is ground glass, the rays refracted by the various points of the lens upon that surface are only visible when they are incident in a line coinciding with the optic axis. So that the rays emerging from the ground glass, and entering the right eye, are only those which have been refracted obliquely in the same direction by the left side of the object glass: consequently, both eyes have a different view and perspective of the object represented on the ground glass; and the single image is, in point of fact, the result of two images, each only visible to one eye, and invisible to the other. This is the main point of Mr. Claudet's discovery,

which cannot be fully understood without reading his paper and repeating the experiments described therein. The stereomonoscope is founded on the same principles—it is nothing more than a camera-obscura, before which are placed the two images of a stereoscopic slide, and, by means of two object-glasses, sufficiently separated, the two images are refracted on the same space, at the focus of the camera-obscura on the ground glass, where they coincide. By the laws mentioned before, the right picture is seen only by the left eye, and the left picture by the right eye; so that, although only one picture appears represented on the ground glass, each eye sees on the same spot a different picture, having its particular perspective; and, consequently, in order to obtain a single vision, the eyes have to converge differently to bring consecutively in the centre of both retinas the different similar points of the two pictures according to their horizontal separation on the ground glass, the criterion of their respective distances. This alteration of the convergence of the optic axis, according to the distances of the various planes, gives the same sensation of relief as we obtain when we look at the natural objects or at their photographic representations. The apparatus may be seen at Mr. Claudet's establishment in Regent-street.

FENN'S PATENT COMPOUND EYELET MACHINE.

Mr. Fenn, the well-known machine and tool manufacturer, of Newgate-street, London, has introduced an excellent compound eyelet machine, which answers both for the purpose of punching the holes in the material and for securing the eyelets in it. This machine is represented in the accompanying engraving. By simply turning the block, the required



sized punch and die can be brought under the lever plunger, thus obviating the necessity of more than one machine; and further, no alteration of nipples is required; consequently the punches and dies will wear much longer than when they have to be shifted by screwing and unscrewing.

Mr. Duncombe's Patent Bill.—We observe with satisfaction that the very ill-advised Patent Bill, which was originated, in all probability, by some needy adventurer aiming to become a patent agent, and introduced into the House of Commons by the eccentric Member for Finsbury, has been ignominiously rejected by that House, as all such schemes should be. The Solicitor-General, in opposing it, made the mistake of asserting that it originated with the patent agents, but we are able and desirous to state distinctly that none of the recognised professional firms ever showed it the smallest countenance. We will explain why in our next number.

HOWELL'S HOMOGENEOUS METAL.

At the Meeting of the Society of Arts, held on the 25th May, Mr. Howell produced a specimen of his homogeneous metal, which, he said, was perfectly malleable and possessed all the strength of fused metal, but was free from lamination, combining perfect ductility with the greatest tensile strength. This was a malleable iron, fused in pots and melted in masses sufficiently large for the manufacture of blocks and sheets from one ton to ten tons each in weight, and these were in all respects as sound and as regular as the specimen he now exhibited. The tensile strength of this metal was to be depended upon up to 50 tons per square inch, and when punched there was no liability to shatter. It was in fact cast steel, but without its brittleness. It was pure iron as nearly as it could be made, means being employed to free it from the impurities which were known to exist in bar iron. Mr. Howell mentioned several of the uses to which this homogeneous metal had been applied; amongst others, for multitubular boilers, coupling chains, &c. The little steam-vessel taken out with the expedition of Dr. Livingstone was constructed of this material, the plates being only one-tenth of an inch in thickness, and these were found to be stronger than the ordinary one-eighth plates used in shipbuilding. In reply to an inquiry, Mr. Howell added that the cost of this metal was 50*l.* per ton, but, from so much less weight being necessary, the expense was not much greater than that of the ordinary plates.

IRON ARMOUR PLATES FOR SHIPS AND BATTERIES.

Mr. Anderson, of the Royal Arsenal, Woolwich, speaking upon the above subject at the Society of Arts, said, an immense effort had been made to manufacture wrought-iron plates of great thickness, for the purpose of floating batteries, so as to render them shot and shell proof; but, although plates had been turned out eight or nine inches thick, yet they failed to afford effectual resistance to these missiles. He thought they might look with some hope to the metal introduced by Mr. Howell as affording a valuable material for ordnance; or to some combination of pure iron with carbon, so as to get a material that could be cast in a mass suitable for cannon. Mr. Anderson expressed a high opinion of the value of Mr. Howell's homogeneous metal, for machinery that was intended for exportation to long distances, and where a large amount of wear and tear was expected. This, he said, had been exemplified in the case of some boilers sent to Russia.

The failure of 9-inch plates to resist solid wrought-iron shot can hardly be doubted, but we think Mr. Anderson is in error when he pronounces them not *shell*-proof. There is a wide difference between the power to resist wrought shot and the power to resist cast shells, and, while the thick plates may well be expected to fail in respect to the former, we do not doubt their efficacy in respect to the latter. This distinction should be carefully borne in mind, by those who have to contrive shell-proof ships. The plates employed should not be too thick to prevent solid shot passing clean through them.

O'NEILL'S IRON TELEGRAPH FOR RAILWAY TRAINS.

A Model of Mr. O'Neill's Iron Telegraph for Railway Trains was exhibited at a recent Meeting of the Institution of Civil Engineers.

An iron bar, extending under each carriage, was suspended on a pin a little from the centre, so as to make one end heavier than the other. The heavy end was securely held in a bridle, by a hanging latch; whilst the light end, which also passed through a bridle, had a tongue which drew out from the bar, and reached under the latch fixed on the next carriage. By disengaging any one of the latches the heavy end fell, and the light end, in rising, threw up the next latch, and so on to the guard's van, where the last light end was arranged so as to ring an alarm. A chain, or wire, could be fixed to each latch and brought into the carriage, so as to give the passengers, in the event of danger, the means of signalling to the guard. A duplicate set of bars on the other side of the carriage enabled the guard instantly to communicate with the driver, if necessary. The end of each tongue had a rising point rivetted loose, so that the porter, when coupling the carriages, could put it in position for disengaging the latch, in case the carriages should become detached by the breaking of the coupling chains. As the bars were not connected, any number of carriages could be taken off, or put on, at a station, by merely turning the loose point on the end of the tongue up or down. The cost of applying this apparatus, it was estimated, would be about thirty shillings per carriage.

THE GUN-BOATS AND DESPATCH VESSELS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Many articles that obtain admission into the periodicals are too general and vague to be of any use except calling attention to the subjects. Such is "Nauticus" on the Surveyorship of the Navy and the Gun-boats. I have had every opportunity of hearing the opinions of the engineers, but have never met with any objection to the engines.

In reference to the builders, the contracts were their own, and, if underrated, the subject is not of public interest, except to give publicity to the considerate attention of the surveyor when the deficit was known —a matter honourable indeed to him, being of rare occurrence in the cold region of officiality.

The allusion to "appropriateness and beauty" is infelicitous: all agree in the former for coast defence and foreign attack, though little tested; but the "beauty" is a great reflection upon the taste of "Nauticus." They are ugly, having the perfect bow of a collier and a run like a "suet pudding." The fact is, the constructors have had Sweaborg and Cronstadt so vividly before them that they sacrificed everything to light draught, believing this would aid their efficiency, not paying sufficient attention to the fact that they had a voyage to perform, heavy and dangerous in winter, and never thinking with all men that they might go to China, or, doubtless they would have had a different form, which would have given a knot or a knot and a-half more speed.

While on the subject of gun-boats, I respectfully think a little data for the future debates upon them and the Haslar slips will be of service; certainly it would have been if possessed by the House of Commons on the Budget nights.

Sir Charles Napier, who took the lead, has never seen them, or he would not have said they were half a mile or a quarter of a mile from the water. The slip is only 800 feet long, and reaches from the middle of the estuary to the top of the works; nor would he have found fault with the site, which is most judicious, and chosen upon the very recommendation the Hon. Baronet gave to purchase all land adjoining public works. It is at the very upper end of Haslar Creek, utilising a large piece of waste land, not needing any deepening of the water, for vessels of twice the draft of the gun-boats can go there; nor does this at all interfere with the vast capacity of the water and mud lands below, adapted for basins and docks.

Other Members were equally wide of their mark, since it was known that two vessels were taken up every tide with only one transverse cradle, two being intended as soon as the first had proved itself, which would double the number without a shilling more expense in the hauling-up staff; and surely, if four a-day can be hauled up an incline, a greater number can be launched, since they run down of themselves in three minutes after being clear of the stalls and transverse rails.

The screw is the only drawback. It was no part of the original plan, but was admitted in the Directors of Works' office in deference to the proposition of the maker, backed by the opinions of two other engineers, seeing it would, at any rate, test a new motive power in a scheme that will become of great national importance, since it is capable of being used for the whole navy, and is about to be adopted by Russia, not only for vessels of war, but to lay up merchant's ships to screen them from the crushing ice.

The first screw was quite a failure, the second very large, and, with double engines, failed at first, but has been made to do. The endless chain will substitute it, I have no doubt, in the new cradles, which are planned with greater lightness and only one-half the friction.

The question of keeping vessels dry or afloat seemed the most important. The returns from the arsenals show that ships rot as 20 is to 12 in favour of sea-going, the fact being, that stagnant damp is their destruction, and would apply to these vessels, but especially to iron, where, from want of being kept perfectly dry, the rivets especially will become oxidated fast, and in a year or two would leak seriously, if not sink, from the heavy concussion in firing the monster guns. All these evils, if the vessels were kept perfectly dry, would be prevented; further, the landing-stage in the dockyard, built and repaired with old oak saturated with sea water, and the new mast-trees kept under water for the very intent, all prove to demonstration from their greater durability that the being saturated is a benefit: in fact, timber is pickled the same as meat, and is preserved thereby.

Finally, the master error in the debates was the idea that the gun-boats in stalls could not be ready for an emergency. This is just the opposite of the fact. If kept afloat they could not possibly be ready, for every ship, after laying up two or three years, has to be docked, caulked, and re-coppered. What could the dock-yard do,

with its little half-dozen docks full now in time of peace, and in confusion during the late short war from the wants of the large ships—what could they do with 200 gun and despatch boats? Whereas, in the stalls they can be kept in just that state of forwardness or completion that the orders of the Admiralty or the political horizon might suggest.

The employment of a large gun-boat armament is a perfectly new era, and must have its necessary concomitants; and I fearlessly pronounce that this project at Haslar is a masterpiece, and will commend itself to the Admiralty and to the nation.

THOMAS WHITE.

GRAHAM'S PATENT STEERING APPARATUS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—In No. 1812 of your publication you allude to the Steering Apparatus patented by Mr. Jno. Graham, of London, and fitted on board eight gun-boats, built for the Brazilian Government by Messrs. Green, of Blackwall, and Messrs. Pitcher, of Northfleet, and, after entering briefly into the arrangement of the apparatus, you at once pronounce it inferior to Mr. Kidman's on account of its complication; in this matter I think you are wrongly informed. It has now been tested upwards of twelve months in my steam-tug, *Friend to all Nations*, under most disadvantageous circumstances, and is in every respect as perfect as the first day it was fitted, which clearly proves there is but little complication.

You also state that the same advantages held out by Mr. Graham are gained by Mr. Kidman's invention, but you omit the fact, that to get the rudder "hard over," from starboard to port, with the latter will require six revolutions of the wheel, while, with Graham's, three revolutions will accomplish the same end. You also refer to the liability of the apparatus being carried away by a shock of the sea; this is entirely erroneous, as the rudder will play backwards and forwards with the slightest motion of the sea, so long as the wheel is kept free, while at the same time if a hand is placed on the wheel the rudder will remain steady without the least labour or trouble to the steersman. The advantage gained in space is also a great consideration. I most respectfully court a personal inspection of the apparatus, when, from your practical knowledge of such matters, I fear not but that you will pronounce the invention, as all who have examined it have done, as being the best yet submitted to the shipping interest.

Much time and study has been given to secure this boon to the shipowner, both as regards the safety of the valuable floating property and also the economy of working it; and I therefore trust the inventor will at your hands receive the credit due to him, and merit the reward of his study and skill by its general adoption.

I remain, Gentlemen,
Your obedient servant,
CHAS. C. NELSON.

11, Langbourn Chambers, Fenchurch-street.
May 10, 1858.

ON THE STABILITY OF FLOATING BODIES.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Mr. Rawson has placed to my credit the very statement which, in each of my letters on the above subject, I was careful *not to make.* I was quite aware that it is not true to say "that, in the case of stable equilibrium, the distance between the centres of gravity and buoyancy is less than in any of the positions of unstable equilibrium." For a body resting on fixed supports this proposition holds: that in every position of stable equilibrium the height of the centre of gravity is a minimum and in every position of unstable equilibrium the height of this point is a maximum. I considered this law well known and well understood; and my object was to show what principle should take its place in the case of a body floating on the surface of a fluid. This purpose, I believe, I have fulfilled. No instance can possibly be an exception to the generality of the theorem, notwithstanding that Mr. Rawson thereto refuses his assent. This gentleman seems to think that it is imprudent for any one to publish a thought on this subject without being previously assured of his approbation. This, as a test of scientific truth, has, no doubt, what merit there is in *great simplicity.* But I have always understood that the cultivators of science and of letters constitute a republic, and are not the subjects of a despotism. I think, also, that your correspondent carries his application of the proverb—"A still tongue makes a wise head"—rather too far. I know many persons who have been much more cautious and reserved upon this question than any of your correspondents, yet, I am quite sure, that most of these quiet and cautious people are unable to deal with the difficulties to which Mr. Rawson alludes. But to the question:—Suppose the

figure 1 to represent the section perpendicular to the axis of a cylinder (not circular). Suppose this cylinder to rest on a horizontal plane, with its axis parallel to the plane.

Fig. 1.

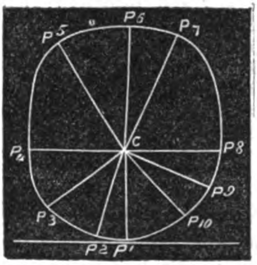
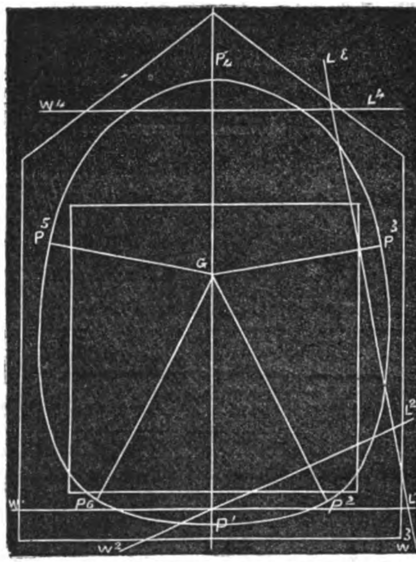


Fig. 2.



Let C be the centre of gravity of this cylinder, and P_1 P_2, &c., points at which the tangents to the curve are perpendicular to the lines joining the centre of gravity with the points of contact. The cylinder will be in a position of equilibrium when any one of these points is on the horizontal plane. There are three cases which I wish to exclude from present treatment,—1st, When the curve has points of contrary flexure. 2. When there are positions of insensible equilibrium. 3. When there are points of double equilibrium.

Suppose, too, that when P_1 is in the plane, the position is unstable, and, therefore, the radius of curvature at P_1 is less than C P_1, then, as I proved in a former letter, the height of C at this point is a maximum, and the cylinder will upset on one side or the other, and the height of the centre of gravity will diminish until another position of equilibrium is reached, when this height will be a minimum. From this position, if the motion be made to continue, the height of the centre of gravity will increase until it reaches another maximum in another position of unstable equilibrium. Thus all the positions of equilibrium are alternately stable and unstable. There must, therefore, be an even number of positions of equilibrium. It follows, then, that in every position of stable equilibrium the height of the centre of gravity above the plane is less than in either of the neighbouring positions of unstable equilibrium. C P_1 is greater than C P_2 or C P_{10}, but it is not necessary that C P_1 should be greater than C P_4, C P_6, or C P_8. It seems, therefore, quite plain that if in any one of the positions of stable equilibrium the point C be higher than in any one of the positions of unstable equilibrium, then there must be at least two other positions—one stable, and the other unstable—intervening on each side.

In all these respects the circumstances of a floating body are identical with those of a cylinder whose section is the locus of the centre of buoyancy of the floating body, rolling on a horizontal plane, and having its centre of gravity in the same position with regard to that curve. I find by construction that the curve in which all the centres of buoyancy of Mr. Rawson's prism are found is of the form represented in Figure 2. P_1, P_2, P_3, &c., is the curve referred to. It will be seen that there are two positions of equilibrium on each side between those given by your correspondent. The whole of these positions, then, amount to six, viz., when G $P_1 = 15{\cdot}5$, G $P_2 = 15{\cdot}8$, G $P_3 = 10{\cdot}6$, G $P_4 = 12{\cdot}5$, G $P_5 = 10{\cdot}6$, and G $P_6 = 15{\cdot}8$ are vertical. These distances I have measured by scale, and they are, therefore, only approximations. G P_1, G P_3, and G P_5, are minima, and therefore correspond to positions of stable equilibrium. G P_2, G P_4, and G P_6, are maxima, and correspond to positions of

unstable equilibrium. I have only one observation in relation to this question to add. It is always true that when a body capable of floating is placed in a fluid, and left to choose its own position of rest, it will take that position in which the height of the centre of gravity above the centre of buoyancy is as small as in any other which it has previously occupied, and less than in that from which it started. Moreover, it will never attain any position in which this height is greater than in the position from which it started. This, I think, solves the question as it was originally started by "Nauticus." And I hope it will clear up all the difficulties which Mr. Rawson thinks too great for me to grapple with. To this gentleman permit me to recommend the question started by "Nauticus," in his last letter, viz., How does the body move when deflected from its position of equilibrium? By all the writers and naval architects with whom I am acquainted the centre of gravity is said to rise and fall in a vertical line while the revolution takes place. I say this is wrong. I don't believe this point does remain in the same vertical. Why should it? Some will say because there are no forces to make it move in a horizontal direction. But, if this be so, how is it that the centre of buoyancy does not remain in the same vertical? Can vertical forces set the water in which the body floats in horizontal motion so as to shift the centre of buoyancy from side to side? "Nauticus" has by no means hit the mark when he says that motion takes place about the metacentre as a fixed point, as the centre of gravity will generally have a motion in a vertical direction, which is inconsistent with his idea.

Yours, &c., A MECHANIC.

SHIPPING STATISTICS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I beg to acknowledge the receipt of the *Mechanics' Magazine*, for Saturday, May 8th, and to thank you for having so obligingly inserted the circular which I had the honour of forwarding you.

There is, however, an omission which, to those interested in the question, may cause the rest to be unintelligible. It occurs in the list of headings taken from the tabular form, in which the *Port of Departure* and *Date of Departure*, *Port of Arrival* and *Date of Arrival*, are omitted; these two items furnishing the most important information of the whole, *viz.*, the time occupied by each vessel on her respective voyage.

If not trespassing too much on your kindness and space the Committee would feel greatly obliged by your laying this addition before your readers.

I remain, Gentlemen,
Your most obedient servant,
HENRY WRIGHT, Hon. Sec.

11, Buckingham-street, Adelphi,
London, W.C., May 10, 1858.

AMENDED PARAGRAPH.

"The information applied for includes—name of vessel and registered number; description of vessel—whether steamer or sailing vessel,—and her rig; port of departure and date of departure; port of arrival and date of arrival; detention on the voyage by stoppage at intermediate ports, or becalmed; &c., &c."

IMPROVEMENTS IN PUMPS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—The last number of your Magazine contains two communications on the subject of pumps which require a passing notice.

The first is that of Mr. Williams (page 439), who proposes to do with the pump that which is sometimes done with the steam-engine, viz., to make the piston a fixture, and the cylinder the moving part. However "successful" such an arrangement may appear to be "on a small scale," no possible advantage can arise in practice from such a topsy-turvy process. It must ever be a wasteful expenditure of power to give motion to a heavy body when precisely the same effect can be obtained by moving a lighter one. The walking beam, as applied to pumps, has long been obsolete; at least, in this country. There is nothing either new or useful in the suggestion of Mr. Williams, "consequently its importance cannot be known."

Mr. Langan (page 442) describes his successful application of an air-chamber to the feed-pipe of a lifting pump as a remedy for its contracted feed-pipe. At page 425 of your 59th Volume, Mr. Langan may find an exposition of the theory and practice of such useful appendages, and also a continuation of the subject in the succeeding Volume. The only novelty in Mr. Langan's case is the materials employed for the construction of his air-chamber, the durability of which is very doubtful.

I am, Gentlemen,
Yours respectfully,
WM. BADDELEY.

13, Angell-terrace, Islington,
May 11, 1858.

PROPOSED WORKING POWER ON THE METROPOLITAN RAILWAY.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I had some hopes that Mr. Nelson's inquiry in No. 1812 would have brought to light some facts, as it is stated in the Company's advertisement that Messrs. Brunel, Fowler, and Scott Russell have fully investigated and conclusively proved the practicability of the motive power by experiments on the Great Western Railway.

The subject is interesting to me, as my patent steam engine will accomplish nearly all the requirements proposed, and far exceed in economy any engine now in use; but I cannot do without fire, and therefore some vapour would emanate from my engine.

I am, Gentlemen,
Your obedient servant,
T. MOY.

1, Clifford's Inn, May 8, 1858.

[If our correspondents will refer to discussions which took place before a Committee of the House of Commons at the time the Company in question obtained its Act, they will, we think, find out what they wish to know.—EDS. M.M.]

SPECIFICATIONS OF PATENTS RECENTLY FILED.

PRINCE, A. *A substitute for varnish, turpentine, and oil, in the manufacture or mixing of paints and pigments, to be employed for coating or covering wood, metal, glass, and other substances, to preserve them from atmospheric influences and fire.* (A communication.) Dated Aug. 4, 1857. (No. 2108.)

This consists in mixing siliceous earth oil with finely-powdered quartz, calcinated soda, purified potash, finely-powdered charcoal, and other ingredients in certain proportions, according to the purposes to which it is to be applied.

ILES, C. *An improvement or improvements in the manufacture of thimbles.* Dated August 4, 1857. (No. 2111.)

This consists in lining the insides of metallic thimbles with a non-metallic lining, for preventing the finger in wearing the thimble from coming in contact with the metal of which the thimble is made.

CAMBRIDGE, W. C. *Improvements in press wheel rollers or clod-crushers.* Dated Aug. 4, 1857. (No. 2113.)

In constructing the compound pressing roller the patentee places upon the axle a number of plain wheels or discs of a given diameter and breadth, and tapered at their periphery to a blunt crushing edge or ribs, alternating these with a serrated wheel or disc of considerably less breadth than the other wheels.

LYNE, T. *An improved field stile or gate.* Dated Aug. 5, 1857. (No. 2118.)

This invention was described and illustrated at p. 147 of No. 1801, Vol. 68.

CROSSLEY, D. J. *Improvements in the treatment of certain textile fabrics called "pellones," and used for saddle covers, and in the machinery or apparatus for effecting the same.* Dated Aug. 6, 1857. (No. 2123.)

This relates to textile fabrics known in the South American trade as "pellones." They are woven with long terry or pile loops formed upon their surface, which, when cut, require to be slightly pointed or tapered at the ends, so as to present the woolly appearance of hair upon a natural skin. To effect this object, when the piece is woven and the loops cut, the patentee finishes the pile or terry as follows:—He temporarily joins the ends of the "pellon" together, so as to form an endless cloth; this is distended over or between two adjustable rollers so as to cause the cloth to rotate, and allowing the long ends of the pile to hang down below the bottom roller. He places a roller or rollers covered with coarse cards, which rollers may either revolve or otherwise, and which, as the fabric progresses, will card or comb the ends of the loop or pile into soft unevenly pointed or tufted forms.

ROWLAND, E. *Certain improvements in steam engines.* Dated Aug. 6, 1857. (No. 2124.)

This consists in substituting, in lieu of the ordinary circular steam cylinder, a chamber having rectangular sides and ends, on which works a piston, and of a longer or more continued form than usual, so as to act or slide parallel within the steam chamber. The piston is connected at or near the centre to the cranks by a connecting rod, a portion of the sides of the cylinder being left open for this purpose, and a metallic packing is employed to retain the piston steam-tight. The steam slide valves for supplying the steam chamber are also formed with rectangular sides, and a metallic packing is likewise employed.

LAWLEY, T. *Improvements in ornamenting articles made of tin plate and of other bright metals.* Dated Aug. 6, 1857. (No. 2126.)

The patentee puts a stop upon those parts which he wishes to remain bright, whilst the other parts are engraved. When this is properly set, the surface uncovered is

ready for engraving. This engraving is effected by means of a fine pumice stone, either used dry or with a spirit. When the parts are sufficiently cut, he removes the stop with pure water. The stop is composed of gum, sugar, and beer, mixed with vermillion.

PARKER, J. *Improvements in the means of supplying or feeding steam boilers with water, whereby a great saving of fuel is effected.* Dated Aug. 6, 1857. (No. 2127.)

This consists in forcing the feed water through hollow fire bars made of copper or other metal.

NEWTON, A. V. *Improvements in mules for spinning.* (A communication.) Dated Aug. 7, 1857. (No. 2131.)

This consists, 1st, in transmitting the power which actuates the mule in its in-and-out motions through cone pulleys, in combination with a means of automatically shifting the band upon the cones. 2d. In backing off the yarn at the moment the spindles are stripped, by means of a friction clutch and stationary band brought into action by the rising of the stripping wire. 3d. In winding on the yarn as the carriage takes in, by means of the aforesaid clutch and band, which clutch is regulated in its bite by the tension of the yarns, so that when the strain upon the latter becomes too great the under faller wire is depressed, thereby opening the clutch and permitting the band which drives the spindles to slip, and thus regulating the degree of lightness with which the yarn is wound. 4th. In giving to the yarns a second draft after the delivery of the ends has ceased. 5th. In operating certain motions upon the carriage, such as the breaking up of the spindles, the backing off and movement of the upper faller by the taking-in scroll chain, &c. 6th. In running the drum band over a vibrating arm upon the carriage and clamping it thereto at intervals, for the purpose of backing off and winding up the yarn.

SHAW, T. G. *Improvements in washing and wringing machines.* Dated Aug. 8 1857. (No. 2132.)

This apparatus consists of a box fitted with a beater put in motion by guide rods working upon a cranked spindle. The upper part of the box is fitted with an oscillating guide bar, through which the guide rods work, and the action of this guide bar converts the reciprocating motion which would be produced simply by the revolution of the cranked spindle to a com pound reciprocating and oscillating motion. The patentee also places in the box a number of rollers, the surfaces of which he renders uneven. These he loosely attaches to one another by strips of leather, and they form a kind of stage or series of floating rubbers. To one side of the box he also attaches a wringing machine, composed of a box fitted with a perforated bottom, which box may be made to communicate with the interior of the trough of the washing machine. This box is fitted with a moveable piston attached to a lever, by which any pressure may be given to the articles placed between the bottom and the piston.

HOLDSWORTH, W. J. *Improvements in weaving woollen damasks.* (A communication.) Dated Aug. 8, 1857. (No. 2133.)

This consists in manufacturing the ground of such fabrics transparent.

LANGFORD, J., and J. WILDER. *Improvements in signals and alarums.* Dated Aug. 8, 1857. (No. 2134.)

This invention cannot be described without engravings.

COLLIER, G., W. NOBLE, and W. HOLROYD. *Improvements in cutting, shaping, and planing wood, and in the tools and apparatus employed therein.* Dated Aug. 8, 1857. (No. 2136.)

These relate, 1st, to the production of imitation wicker or basket work for carriage or other uses in wood, by the use of a cutting tool of a peculiar construction operated by mechanical means. 2d. To the production of rotary cutters for the formation of mouldings and other ornamental forms. 3d. To cutting or planing boards or other plane surfaces. 4th. To employing elastic pressure to keep the wood under operation in contact with the planing tools. 5th. To forming cylindrical surfaces of wood, such as cornice poles and the like. 6th. To the employment of rotating cutters for moulding and other figures when such are operated to have a to-and-fro motion as well as a rotary motion. 7th. To applying heat to the surface of the wood during the operation of cutting, better to prepare the surface for the action of the tools.

BERTRAM, J., and J. L. JULLION. *Improvements in the manufacture of paper.* Dated Aug. 10, 1857. (No. 2139.)

This relates to the use of dry air applied to the surface of paper during its passage over the drying cylinders in the manufacture. This the patentees accomplish, 1st, by desiccating the air by means of chloride of calcium or other chemical agent. 2d. By applying the air so prepared to the surface of the said paper through perforated hollow drums placed within the drying cylinders, so as to admit the air under pressure by any of the usual mechanical means.

ROBERTS, J., jun. *Improving the com-*

bustion of fuel, and preventing the escape of fuliginous smoke from shafts and flues. Dated Aug. 10, 1857. (No. 2140.)

This consists in fitting to the interior of the shafts or flues perforated plates arranged so as to divide the lower portion of the shaft or flue into separate compartments, so that the smoke may be conducted through the same, and sifted or purified on its passage to the atmosphere.

RENTON, A. H. *Improvements in apparatus for steering vessels.* (A communication.) Dated Aug. 10, 1857. (No. 2143.)

This consists in operating upon the rudder stem by two tangent or endless screws, working into a suitable wheel, through which the upper part of the rudder stem passes and slides freely, the screws being actuated by gearing, which connects them with the steering wheel. The screws (the threads of which are right and left handed respectively), being worked simultaneously, and in the same direction, retain the rudder in any desired position, at the same time that perfect control is obtained over its motion.

GODEFROY, P. A. *An improved method of desulphurizing mineral matrix, for the extraction of auriferous, argentiferous, and other metals contained therein.* Dated Aug. 10, 1857. (No. 2144.)

This consists in separating the sulphur or sulphurets from all mineral matters by the use of fluids composed of the strongest known alkalies under a high temperature.

CHAMBERS, G. *Improvements in separating cinders from ashes and economizing fuel.* Dated Aug. 11, 1857. (No. 2145.)

The object here is the adjustment of apparatus to the ordinary grate in suchwise that, when partial combustion of the fuel in the grate shall have taken place, and the fuel be so burnt as to cause the cinders to fall through the ordinary under bars of the grate, such cinders shall be caught upon and upheld by the bars of the apparatus, the ash passing through them, until either more complete combustion shall have taken place, or until they shall, by the withdrawal of the apparatus, be again cast upon the fire. The ultimate ash falls into a concealed ash pan under the cinder bars.

LANG, A. *Improved machinery for feeding steam boilers.* Dated Aug. 11, 1857. (No. 2146.)

This invention cannot be described without engravings.

HUSBAND, R. *An improvement in the manufacture of hats.* Dated Aug. 11, 1857. (No. 2147.)

The object here is to make the hat body so that the paper used therein, whether plain or bearing any suitable embellishment, may retain its beauty throughout the process, and so may be available, not only to strengthen, but also to adorn the hat body.

GROUNDWATER, W. L., and H. PRINCE. *Improvements in pumps.* Dated Aug. 11, 1857. (No. 2148.)

The improved pumps have their parts arranged with the view of facilitating their working, and the taking of them to pieces.

NEWTON, W. E. *Improvements in pickers for looms.* (A communication.) Dated Aug. 11, 1857. (No. 2149.)

This consists in making a picker without a seam or joint, by the use of a composition consisting of a preparation of hard india-rubber, gutta percha, &c., this material being vulcanised in the customary manner in suitable moulds.

HARDCASTLE, T. *Improvements in machinery for washing textile fabrics.* Dated Aug. 12, 1857. (No. 2150.)

This consists in causing the fabrics to be washed to pass through eyes made in the ends of arms which vibrate rapidly in a cistern partly filled with water, and strike the fabrics as they are drawn forward by squeezing rollers against stationary guards. The fabrics in passing to and from the vibrating arms are guided by rollers and winches.

WAGSTAFF, R. *Certain improvements in machinery or apparatus for digging land.* Dated Aug. 12, 1857. (No. 2151.)

First, for applying the direct action of steam to digging land, the apparatus consists of a set of steam cylinders, in which work pistons and rods, similar to an ordinary steam engine. To each of the piston rods is attached a connecting rod terminating in a spade or fork, at a point, between which and the connecting rod joint in each alternate cylinder is attached a lever or rod having a hinge joint at the middle, the other end being secured to the framing, or in connexion with an apparatus for working by hand. The spades or forks cut in squares, one set cutting the sides of the square, the others cutting the ends, and lifting and turning it over. This invention also includes the improvements described in the next abstract of specification No. 2152.

WAGSTAFF, R. *Certain improvements in locomotive engines to be employed on common roads or ways applicable to agricultural and other similar purposes.* Dated Aug. 12, 1857. (No. 2152.)

This consists in driving the main wheels by the friction of contact of other wheels, in order that the wheel at either side of the engine may be worked irrespective of the other when required. The patentee secures lags of wood or iron across, and somewhat

broader than, the tire or rim, so that, in passing over the soft ground, the interstices between the lags will allow the adhering clay, &c., to pass through and prevent the wheel from being encumbered by the accumulation thereof. These lags enable the wheel to hold or "bite" the surface, and prevent slipping; or they may, if preferred, on good travelling roads be dispensed with. The steering is effected by the front pair of wheels, which are also in connexion with, and governed by friction gearing, worked by bevel wheels, by the motion of the guiding wheel or handle.

Cantelo, W. J. *Improvements in the preservation of vegetable matters.* Dated Aug. 12, 1857. (No. 2153.)

This consists in drying vegetable substances by means of surfaces composed of enamelled metal, slate, glass, earthenware, or like material, heated by hot water or steam.

Clarke, W. A. *Improvements in the construction of, and mode of applying hot-air and vapour baths.* Dated Aug. 12, 1857. (No. 2154.)

This consists in constructing the bath so that the hot air or vapour may be introduced into the bath, and diffused more uniformly than heretofore. The bath is constructed of zinc, to admit of the body lying horizontal. The head of the patient extends beyond the bath, and is supported by a rest. A groove is made all round the upper edge of the bath, and when the patient has been placed in the bath on a board or wooden frame, a zinc cover is placed on in such manner that the lower edges of it are received in the groove round the upper edge of the bath, and by filling this groove with water a steam-tight channel all round the bath will be obtained, except where the head extends beyond the cover. This part is also made as steam-tight as possible by blankets, or cloths. Steam or vapour is admitted by a perforated pipe arranged in a serpentine direction, so that it may be diffused over the lower part of the bath. Above the perforated pipe, and beneath the board on which the patient is lying, is placed a sheet of perforated zinc, which will cause the vapour to be more diffused, and will not permit any rush of hot vapour striking upon any part of the patient.

Pratchitt, W., and S. Horrocks. *Improvements in apparatus to regulate the pressure of fluids, and to compensate for the expansion of steam and hot-water pipes.* Dated Aug. 13, 1857. (No. 2155.)

This consists—1st, in the application of a balanced valve to a mercury gauge. 2. In the introduction between steam and hot water pipes of a compound chamber of elastic plates, and so united together that the internal pressure on the outer chamber is balanced by the external pressure on the inner chamber.

M'Adam, R. *Improved apparatus to be employed in making cheese, and in drawing-off liquids.* Dated Aug. 13, 1857. (No. 2157.)

This consists of a small vessel made to float near the surface of the liquids to be separated, by means of a shallow air vessel. The sides and bottom of it, or portions thereof, are of wire cloth, through which the lighter liquid enters to the interior, and in the case of the curds and whey the wire cloth forming the sides of the receptacle is of such a fineness as to prevent the curds from entering along with the whey. The whey or lighter liquid passes off by a pipe of some flexible material, and passes down through the heavier liquid to a tap or spigot fitted into the lower part of the tub containing the matters to be separated. Provision is made for admitting air into the receptacle to allow the liquid in it to flow completely away down the pipe. The air enters by air holes in the flange of the handle, which is fixed to the top of the float, and passes through a tubular passage into the receptacle.

Bosworth, J. A. *Improvements in machinery for grinding and crushing clay and brick earth.* Dated Aug. 13, 1857. (No. 2159.)

A circular track or platform is used, the circular iron frame of which is constructed in sections, fixed together by screw bolts and nuts. On this circular frame iron bars are placed side by side, and in radial directions, there being a space between each two neighbouring bars. On this circular track or platform edge stones or runners roll, and they are caused to do so by an upright shaft, which receives a rotary motion from a steam-engine. The arms from the upright shaft are attached by pin joints to the axes of the runners or edge stones, in such manner that the outer side of such axes on which the runners or edge stones revolve may rise and fall. Between the axis and the inner edge of the circular track or platform a conical incline is formed, on to which the clay or brick earth is placed, and down which it slides to the circular track or platform.

Bousfield, G. T. *Improvements in sewing needles.* (A communication.) Dated Aug. 13, 1857. (No. 2160.)

This relates to the manner of forming the eyes of needles so that the thread can be introduced from the side of the eye at any part of the thread. The peculiarity consists in forming a spring opening or

mouth in one side of the eye of the needle of such a form as not to catch in the cloth being sewed as the needle passes through.

NEWTON, W. E. *Improved machinery for cutting files.* (A communication.) Dated Aug. 13, 1857. (No. 2161.)

This consists—1st, in constructing and operating the bed on which the file is cut so as to have a forward feed motion, and at the time of the blow of the hammer a slightly independent forward motion of the upper half of a compound bed (or united bed, as the case may be) caused by the percussion of the hammer on the chisel, in upsetting the burr or teeth of the file against the back edge of the chisel in consequence of its angle of cut wedging it forward at the time of cutting the teeth in the file blank, and the difference of resisting surfaces of metal. 2. In constructing and operating the cutter or chisel holder and stock, so as to cause the chisel to find its own level upon the file blank at all times under the stroke of the hammer, so as to make the cut uniformly across the face of the blank. 3. In actuating the hammer by cams, the hammer shaft being provided with a regulator, ratchet wheels, and springs, whereby the force of the hammer may be varied at pleasure, 4. In effecting the feed motion by an intermittent worm on the main driving shaft operating on a male and female screw or rack and pinion for working an inclined plane, whereby the bed on which the file blank is cut is moved forward. 5. In a mode of operating the inclined plane. 6. In a mode of constructing the tang holder.

PARKINSON, J. *Improvements in the construction of pressure and vacuum gauges.* Dated Aug. 14, 1857. (No. 2164.)

The patentee makes the tube, into which the mercury rises, of gutta percha, or other material not liable to oxidation, and not acted upon by mercury; by this means the relative proportion of the diameters of the tubes remain at all times the same, and the indications of the pressure remain true. He prefers to enclose the gutta percha tube in a metal one to protect it from injury.

LAVIRON, P. E. *Improvements in apparatus for curing smoky chimneys and for increasing the draught in them.* Dated Aug. 14, 1857. (No. 2165.)

These apparatuses consist chiefly of a fan or blower, worked by the wind, or by a counter-weight or spring, the said fan acting in a centrifugal manner, so as to exhaust from the chimney the smoke, gases, noxious or dangerous effluvia, and projecting them towards the outside of the top of the chimney, thus creating or increasing considerably the draught.

GUMM, C. *Improvements in the construction of boats.* (A communication.) Dated Aug. 14, 1857. (No. 2167.)

This consists in giving to a boat a peculiar form, and in the employment in such a boat of self-acting forcing valves, a water ballast tank, and buoyant air chambers to "right" the boat. The peculiarity of form consists in her lines being the same fore and aft, and in an unusual amount of sheer and camber.

LIPSCOMBE, F. *Improvements in the mode of diverting the London sewage from the River Thames and discharging it into the sea.* Dated Aug. 14, 1857. (No. 2168.)

This invention was described at p. 461 of No. 1788, Vol. 67.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

MACPHERSON, P. *Improvements in wheeled carriages or vehicles.* Dated Aug. 4, 1857. (No. 2109.)

This relates to carriages with low hung bodies. As applied in carts for the transmission of cattle, &c., the body of the cart is framed up rectangularly to a sufficient height, and the wheels are so attached that the bottom of the body but little more than clears the ground. This is effected by attaching short carrying spindles one on each side of the body sufficiently high up for the purpose. The wheels may either run loose upon their spindles, or be fast thereon. The top and back end of the body are hinged like doors. For wheels where springs are necessary a modified arrangement is adopted.

JOHNSON, J. H. *Improvements in sewing machines.* (A communication.) Dated Aug. 4, 1857. (No. 2110.)

This consists, 1st. In driving the circular needle by means of a spiral groove and elastic driver. 2. In forming a flat or straight portion on the vertical spindle for holding the circular needle stationary, whilst the driver continues to move the required distance. 3. In making this driver of several layers of spring metal to make it elastic. 4. In attaching this driver to the opposite end of the vertical needle lever. 5. In applying the power which operates the vertical needle lever directly, or nearly so, underneath the vertical needle. 6. In placing india-rubber, &c., between the machine and the table which supports it. Lastly. In driving the machine by means of a band of india-rubber.

CAMBRIDGE, W. C. *Improvements in the construction and working of endless travel-*

ling railways. Dated Aug. 4, 1857. (No. 2112.)

The object here is to prevent the ends of the portions forming the railway from digging into the ground and taking up dirt, &c., at the joints, also to prevent the wheels from slipping on the rails.

NEWTON, A. V. *Improvements in umbrellas and parasols.* (A communication.) Dated Aug. 4, 1857. (No. 2114.)

The chief object here is to neutralise the effects of the wind on umbrellas when in use, and also to render less power required to hold them up. This end is attained by allowing the head of the umbrella to turn independently of the stick or handle.

LITTLEWOOD, J., and A. SCHLUMBERGER. *Improvements in producing printed or dyed colours from murexide on woollen fabrics or yarns, or mixed fabrics, or yarns of wool and cotton.* Dated Aug. 5, 1857. (No. 2115.)

For printing purposes the inventors take fabrics or yarns of wool, &c., previously well bleached, and prepare them with a mordant of binoxide of tin. After the preparation, they print on murexide mixed with a mordant of lead. When dry the goods are passed into a mercurial solution, and from this into water, and then dried. There are modifications included.

BOTTURI, S. *An apparatus and oven for carbonization and distillation of all animal and vegetable matters.* Dated Aug. 5, 1857. (No. 2116.)

The ovens are so constructed as to extract all the chemical properties contained in the matters which are to be treated and subjected to distillation and division of fluids, gas, &c., which are therein found, and conducted to an apparatus so disposed as to utilise them, or to cause them to evaporate, or to bring them into use as combustibles.—*The time for filing the final specification of this invention has been extended by the Lord Chancellor, on account of the sickness of the inventor.*

BOTTURI, S. *The making of moveable chairs and seats of every kind and description, to be called Botturi's moveable chairs and seats.* Dated Aug. 5, 1857. (No. 2117.)

This relates to all kinds of chairs, viz., couch, canopy, arm chairs, &c., and consists in so constructing them as to be able to dismount the seat. The advantage of these chairs is, that the cloth, or stuff, not being nailed to the frames, the fitting of a room may be easily changed into any other style with the greatest facility.—*The time for filing the final specification of this invention has been extended by the Lord Chancellor, on account of the sickness of the inventor.*

FIELD, T. *Effecting improvements in parasols and umbrellas.* Dated Aug. 5, 1857. (No. 2119.)

This consists in constructing the handles of parasols, &c., so that the lower half can be pushed into the upper half, similar to a two-barrel telescope. Around the upper half of the stick is a spiral spring, so arranged that its tendency shall be to close the parasol, &c., and keep it closed, without the aid of the ordinary outside fastening. The ordinary spring catch for keeping the parasol extended is dispensed with, and the effect produced by means of a spring arranged in connexion with the runner notches tube. India-rubber is employed to cause the lower half of the stick to work firmly in the upper half.

MIDDLETON, S., and J. LOWES. *Improved apparatus for the extinction of fires in buildings.* Dated Aug. 6, 1857. (No. 2120.)

This consists, principally, in having a main pipe in connexion with the ordinary water main in the street, running up the entire height of the building. From this main pipe, at about the level of the ceiling upon each floor, is a branch pipe, which runs round the top of each room, and is furnished with hollow balls which project into the room. These balls are perforated or furnished with openings in such a manner as to distribute the water in the form of a fan, and each room is provided with a sufficient number of balls to flood every portion of such room when the water is turned on.

BOTTURI, S. *A system of weaving for the manufacture of all kinds of textile goods, viz., shawls, silk-stuffs, carpets, knotted or unknotted, single, or double-faced, gobelins, tapestry, drapery, velvets, damasked linen, and various other articles, by means of a frame which replaces the Jacquard loom.* Dated, Aug. 6, 1857. (No. 2121.)

The specification of this invention is too lengthy to admit of our giving an intelligible description of it in our pages.

DALGETY, A. *Improvements in rotary engines and pumps.* Dated Aug. 6, 1857. (No. 2122.)

This invention cannot be clearly described without engravings.

GILMOUR, W. *Improvements in obtaining motive power.* Dated Aug. 6, 1857. (No. 2125.)

This relates to the obtainment of a continuously acting motive power by means of weights operating upon combinations of levers, or parts acting on the lever principle. Reference to the engravings is essential in giving a detailed description of the invention.

Lowissöhn, B. *An improvement in the manufactvre of soap.* Dated Aug. 7, 1857. (No. 2128.)

This consists in introducing into the ordinary soap materials Irish moss, which has been reduced to a gelatinous state by boiling in water.

Bradley, J. *Certain improvements in machinery or apparatus for engraving metallic cylinders or rollers employed for printing calico and other surfaces.* Dated Aug. 7, 1857. (No. 2129.)

This relates to transferring and reducing certain patterns or designs from an enlarged diagram or figure to the surface of metallic cylinders or rollers used in calico printing.

Scartliff, J. R. *Certain improvements in mathematical instruments.* Dated Aug. 7, 1857. (No. 2130.)

This refers mainly to measuring instruments; such, for instance, as compasses, &c., and has reference to the joints thereof. The head or joint part of the "he limb" has one half of its periphery toothed to work in a small pinion pinned in a slot in the shoulder of the "she limb." Upon the face of this shoulder is placed a circular dial engraved upon the face in feet and inches. The rivet carries a pointer or index, which, as the compasses are opened, denotes the number of feet or inches which the points of the compasses may be asunder, so that the ordinary scale or rule would not be required. There are modifications included.

Oschinsky, J. *An improved soap, to which he gives the name of "rheumo-arthritic soap."* Dated Aug. 8, 1857. (No. 2135.)

The inventor claims the manufacture of soap produced by combining with the materials commonly used camphine and ammoniac.

Anderson, J., J. F. Rushworth, and J. Benn. *Improvements in machinery for moulding, cutting, and carving wood and stone.* Dated Aug. 8, 1857. (No. 2137.)

These relate to apparatus applied to planing machines, such as used for cutting stone, metal, and other hard bodies, whereby the cutting tools are so operated upon as to cause the production of moulded or carved ornamental forms on the wood or stone being planed or operated upon in the machine.

Shaw, T. G. *Improvements in machinery for thrashing and separating wheat and other grain.* Dated Aug. 10, 1857. (No. 2138.)

These consist in giving a combined reciprocating and oscillating motion to one or more beaters, by attaching them to a series of connecting rods working through an oscillating guide bar, the opposite ends of such connecting rods being attached by proper bearings to, and put in motion by, the revolution of a cranked spindle, or by eccentrics.

Tremeschin, A. *Improvements in curling tongs.* Dated Aug. 10, 1857. (No. 2142.)

These consist in fixing the one part of the tongs in a handle, which constitutes the principal limb of the tongs, for which the inventor uses the round limb. The hollow limb he joints to the main limb, and extends beyond the joint in the direction of the handle a thumb piece, on which the thumb of the hand in which the tongs are held is applied to press and open the tongs. A spring is applied, by which the jointed limb is closed when released from the pressure of the thumb.

Collingridge, H. *Improvements in separating metallic substances from coffee, and in the apparatus employed for the purpose.* Dated Aug. 13, 1857. (No. 2156.)

This consists in separating metallic substances from coffee by means of magnets or electro-magnets which hold the metallic substances while the coffee moves past them; the apparatus consists of an inclined slide, down which the coffee is allowed to fall, and to the surface of which is applied a number of magnets or electro-magnets.

Benson, J. W. *Improvements in the construction of bows or handles of watches, lockets, eye-glasses, and other articles requiring such appendages.* Dated Aug. 13, 1857. (No. 2162.)

This consists in making the bows or handles with a double swivel, which will admit of their turning round in various directions, so that, should any attempt be made to twist off the bow from the article to which it is applied, it will turn on its axis, instead of offering a rigid resistance, which may be easily overcome by using a moderate amount of force.

Eade, T. *An improved breech-loading fire-arm, and projectile to be used therewith.* Dated Aug. 13, 1857. (No. 2163.)

The first part, relating to breech loading fire-arms, consists in making the barrel with a moveable hinged breech to receive the charge. The second, relating to a projectile to be used with said fire-arm, consists in making a projectile or bullet with a hollow base and inclined planes on the outside of the projectile. The hollow base keeps the weight of the projectile in the front thereof, and the wings ensure accuracy of flight by causing rotation.

TICKLE, J. *Improvements in metallic pistons for steam and other cylinders.* Dated Aug. 14, 1857. (No. 2166.)

These pistons are adjustable and furnished with a bolt or angle-piece, which may be forced outward, to increase the circumference of the rings in contact with it, and these rings fitting within the outer rings will cause them to expand likewise.

PROVISIONAL PROTECTIONS.

Dated April 7, 1858.

742. Frederick Haines, of Lime-street, City. The application of manufactured india-rubber as a substitute for whalebone, steel ribs, and other like articles, to various parts of ladies' dress.

Dated April 12, 1858.

786. James Bailey, Edward Oldfield, and Samuel Oddy, all of Salford, Lancaster, machine makers. Improvements in machinery for driving grindstones and glazers.

788. Paul Michel, of Paris, dyer. An improved neckcloth or tie, means of connecting ties to collars, and an improved collar. A communication from C. A. Jordery, of Paris.

790. William Clark, of Chancery-lane. Improvements in the pattern surfaces or cards of Jacquard apparatus. A communication.

Dated April 13, 1858.

792. Henry Whittles, engineer, of Rochdale, Joseph Schofield, manufacturer, of Littleborough, Edmund Leach, manager, of Littleborough, and James Lord, solicitor, of Rochdale. Improvements in certain parts of steam engines.

796. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., Editor of the *Mechanics' Magazine* and Patent Agent. Improvements in cranes or apparatus for raising and lowering weights. A communication from J. B. Borde.

798. Peter Allembert Yardin, of Moorgate street, truss manufacturer. Improvements in trusses.

800. William Edward Newton, of Chancery-lane. Improved means for operating railway breaks. A communication.

Dated April 14, 1858.

802. George Pye, of Blackburn, Robert Smith, of Longridge, near Preston, and Benjamin Croasdale, of Whitton, near Blackburn. Improvement in looms.

806. John Gorham, of Tunbridge, surgeon. Improvements in optical instruments by the revolution of which various designs or patterns may be produced to the eye.

808. John Gray, of Uddingston, Lanark, agricultural engineer. Improvements in ploughs.

810. Edward Green, of Wakefield, engineer. Improvements in implements for harrowing, pulverizing, cleaning, and breaking up land.

812. John Knight, of Woodhouse Mills, near Rochdale, bleacher and finisher. Improvements in machinery or apparatus for scouring, washing, and cleansing textile fabrics.

Dated April 15, 1858.

814. Charles Davies, of Duffryn, William Jones, of Caerleon, and John Jones, of Maindee, near Newport, all in Monmouth. An improved method of finishing tinned, terne, or lead plates, without the use of grease.

818. John Meyers, of Westmoreland-place, City road, furrier. Improvements in the treatment of dark fur skins, in order to render them more highly ornamental.

820. William Edward Newton, of Chancery-lane. Certain improvements in boots, shoes, and other coverings for the feet. A communication.

822. Anguish Honour Augustus Durant, Esq., of the Conservative Club, St. James's. An improved apparatus for husking and winnowing castor (and other) seeds and berries.

Dated April 16, 1858.

824. John Gardine Hodges, of Manchester, merchant. Improvements in machinery or apparatus for embroidering.

826. George Gibson Brown, of Wickham-terrace, New-cross. Improvements in ships' binnacles.

828. Astley Paston Price, of Margate, chemist. Improvements in the treatment of certain zinc ores and compounds of zinc, and in the manufacture of zinc and oxide of zinc.

830. Astley Paston Price, of Margate, chemist. Improvements in the treatment and smelting of certain argentiferous or silver ores.

Dated April 17, 1858.

832. Jozé Luis, of Welbeck-street, Cavendish-square. A new system of window frames for railway carriages. A communication.

836. François Charles Gilbert, of Paris. A disinfecting composition to purify waterclosets, and all insalubrious places

838. George Wood Bancroft, of Bow-road, gentleman. Improvements in the construction of certain parts of railway carriages, to ensure safety in travelling.

840. William Carron, of Birmingham, machinist. Improvements in constructing moulds for casting nails, spikes, and bolts.

844. Charles Hawker, of Fishbourne, Isle of Wight, salt manufacturer. An improved manufacture of cartridge for fire arms. Partly a communication from T. P. Hawker.

846. Thomas Luck, of Spalding-common, Lincoln, agricultural implement maker. Improvements in machinery for raking and seeding land.

848. Josiah George Jennings, of Holland-street, Blackfriars, engineer. Improvements in the construction of sewers, culverts, arches, and other similar structures, and in the manufacture of blocks of clay, pottery, and other similar wares suitable to be used in such constructions.

Dated April 19, 1858.

850. John Drake, jun., of Huddersfield, mechanic. Improvements in sewing machines.

852. William Bullough and Joseph Harrison, both of Blackburn, machine makers. Certain improvements in looms for weaving, and in machinery for winding the cord, used in the manufacture of weavers' healds.

854. Henry Edwards, of Dalston, gentleman. Improvements in trowsers or other similar articles of wearing apparel.

856. John Martin Rowan, of Glasgow, and Thomas Rogers Horton, of Birmingham, engineers. Improvements in steam engines and boilers.

858. John Armstrong, of Sunderland. Improvements in apparatus used for preserving timber.

Dated April 20, 1858.

862. William Stettinius Clark, of Upper Park-place, Dorset-square. A nautical safe and life preserver. A communication from F. C. Smith, of the United States.

866. John Baptist Smith, of Hockley, near Birmingham, agent. Improvements in adjusting the position of pendent and other lamps.

868. James Leadbetter, of Leeds, brazier, and George Terry, of the same place, ironmonger.

provements in the manufacture of metallic trunks and other receptacles for property.

Dated April 21, 1858.

870. John Adkins, of Church-street, Islington, gentleman, and Thomas Odemcy Lebert Buss, of Hatton-garden, specific gravity instrument maker. Certain improvements in ships' compasses.

872. Alfred Shrimpton, of Stanley-street, Pimlico. An improvement or improvements in the manufacture of metallic bedsteads, and other articles for sitting, lying, or reclining upon.

874. James Copcutt, of St. John-street, Clerkenwell. Improvements in the manufacture of gas, and in the apparatus employed therein.

876. James Horsey, of Greek-street, india-rubber manufacturer. Improvements in india-rubber and other pouches, and in elastic band or ring fastenings for pouches.

878. Joseph James Lane, of Newgate-street, engineer. An improved arrangement of punches and dies in eyelet machines.

Dated April 22, 1858.

882. Samuel Clegg, of Putney. Improvements in gas meters.

884. George Gilmour, of Massachusetts, United States. A telegraph cable or rope shackle.

888. Henry Andrew De Saegher, of Brussels, gentleman. A composition proper to prevent the incrustation of steam boilers.

892. John Birch Paddon, of Gray's-inn-road, engineer. An improvement in gas regulators.

894. Thomas Donkin, of the firm of Bryan Donkin and Company, of Bermondsey, engineer. Improvements in apparatus employed in the manufacture of paper, applicable also to controlling the motion of travelling webs and fabrics. A communication from Gabriel Planche.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," May* 11, 1858.)

3187. F. Palling. The construction of candles, lamps, and candle-lamps, without wicks.

3197. A. J. M. Ramar. Improvements in ornamental and portable fountains.

6. J. W. Clare. Improvements in steam engines and boilers, part of which improvements is applicable to furnaces.

7. J. H. Johnson. Improvements in penholders, pencilcases, and other articles, sliding in cases of a like nature. A communication.

8. R. Harvey. Improvements in steam hammers.

9. A. Slate. Improvements in apparatus for supplying fuel to blast furnaces.

10. T. Scott. Improvements in cleaning, separating, and mixing seeds, and in apparatus for those purposes.

21. H. C. Jennings. Improvements in the production and application of tannin or tannic acid.

26. F. P. Cappon. Self-acting pads for doors, shutters, windows, or other similar shuttings.

31. G. J. De W. de Winton. Improvements in copying apparatus. A communication.

53. R. A. Brooman. Improvements in the preparation of coal and other fuel. A communication.

56. W. Parsons. Improvements in apparatus for supplying water to, and for preventing explosions of steam boilers.

114. W. Clark. Improvements in lubricating apparatus. A communication.

145. R. Heaton, jun., and G. Heaton. An improvement or improvements in annealing metals.

169. W. and C. Kaye. Improvements in mattocks, picks, hoes, hammers, and similar implements and tools.

176. P. Ashcroft. An improved mode of supporting the rails of railways in their chairs.

186. W. J. Hay. An improved composition suitable for covering the caulking of ships and other like purposes, for uniting wood and other substances, for filling up seams, and for use as a waterproof composition generally.

476. H. Deacon. Improvements in purifying alkaline lees.

553. J. Webster. Certain new or improved metallic alloys.

770. H. Bauerrichter and C. G. Gottgetreu. Improvements in printing in gold, silver, bronze, and other metal, on glass.

808. J. Gray. Improvements in ploughs.

818. J. Meyers. Improvements in the treatment of dark fur skins, in order to render them more highly ornamental.

828. A. P. Price. Improvements in the treatment of certain zinc ores and compounds of zinc, and in the manufacture of zinc and oxide of zinc.

830. A. P. Price. Improvements in the treatment and smelting of certain argentiferous or silver ores.

855. M. Henry. Improvements in the manufacture of candles, and in preparing materials for the same, and in apparatus employed therein. A communication.

858. J. Armstrong. Improvements in apparatus used for preserving timber.

874. J. Copcutt. Improvements in the manufacture of gas, and in the apparatus employed therein.

875. W. H. F. Talbot. Improvements in the art of engraving.

876. J. Horsey. Improvements in india-rubber and other pouches, and in elastic band or ring fastenings for pouches.

882. S. Clegg. Improvements in gas meters.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

1016. Johnson Hands.
1019. John Henry Johnson.
1027. Thomas Taylor Lingard.
1030. John Allin Williams.
1031. James Bowron.
1035. Thomas Williams and John Hobson Fuller.
1036. Robert Kanzow Bowley.
1044. Duncan Morrison.
1057. John Harris and Thomas Summerson.
1088. Thomas Charles Eastwood and Thomas Whitley.
1099. George Tomlinson Bousfield.

LIST OF SEALED PATENTS.

Sealed May 7th, 1858.

2825. William Wilson and James John Joseph Field.
2833. George Weedon and Thomas Turner Weedon.
2836. William Devon.
2838. Charles Eugène Lecointe.
2845. Peter Madden.

2847. Otto William Wahl.
2851. Joshua Williams.
2854. Françoise Honorine Felicie Bertrand de Suray.
2909. John Clarke.
2917. Joseph Denton.
3017. Marc Antoine François Mennons.
3049. James Hoddell.
3071. Jean Pierre Brignon.
3114. Robert Oxland.
3148. William Nunn.
470. Henry Doulton.

Sealed May 11th, 1858.

2852. Ebenezer Coleman.
2858. William James Gifford.
2863. George Haseltine.
2873. John Edward Hodges.
2875. James Taylor.
2880. Daniel Foxwell.
119. James Brown.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICES TO CORRESPONDENTS.

The letters of Nauticus, J. A. D., Mr. Taylor, and some others are in type, but the publication of them is unavoidably deferred from want of space.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

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Mechanics' Magazine.

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Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London, E.C.

REAPING MACHINES.

Fig. 2.

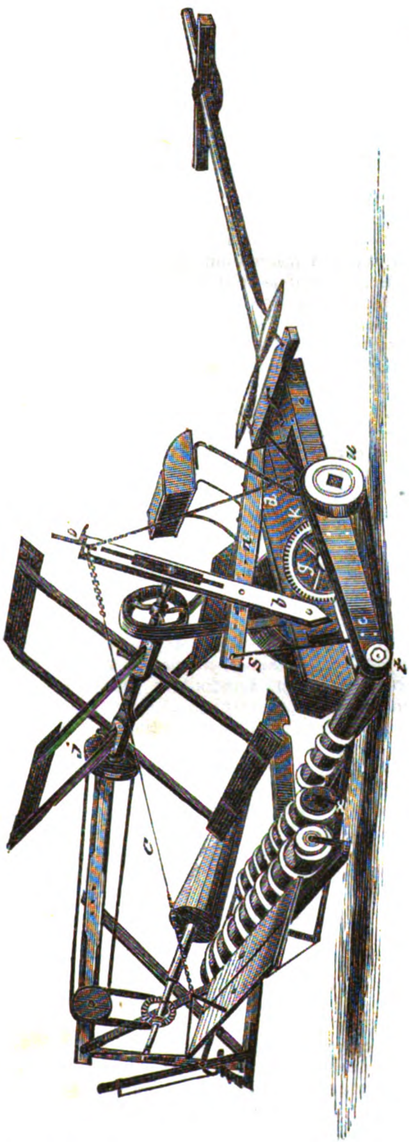
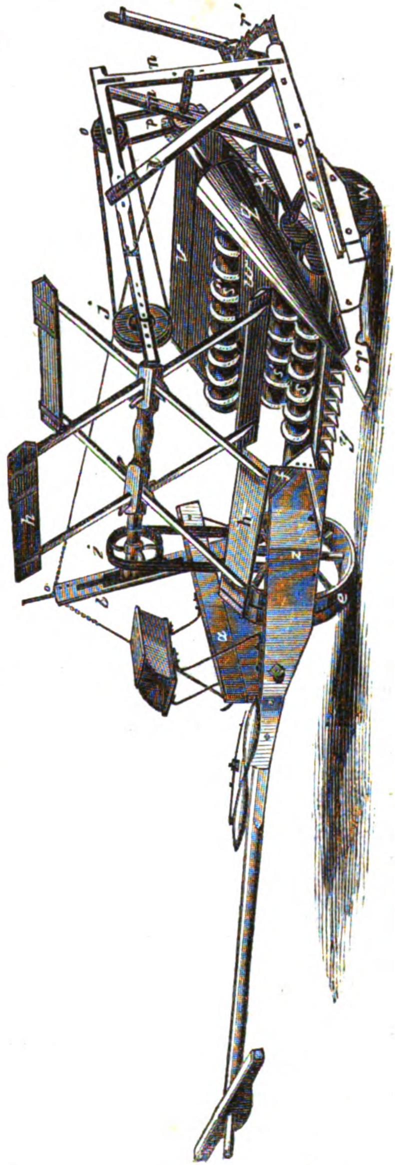


Fig. 1.



REAPING MACHINES.

THE mechanical spirit of this age never recedes, never even delays, but, having once infused itself into any art, or any species of labour, works and spreads itself there, until its triumph over manual operations is complete and lasting. There never has been, and never can be, in civilized states, an example of the final abandonment of a machine which has been openly proved capable of economically and efficiently superseding hand-labour, where such hand-labour is constantly or frequently in demand. These facts leave no room whatever for doubting the permanence of the results which have of late years been obtained in the progress of agricultural machinery, and our farmers may therefore abandon for ever all lingering expectations of driving modern ploughing, sowing, and reaping machines from their domains.

In order to spread a knowledge of what has been done, and is now doing, in this department of industry, and to afford a tolerably accurate judgment of the extent to which machinery will be applied to the gathering in of crops in the coming harvest, we propose to state a few facts in connection with reaping machines, which have now been brought nearer to perfection than any other agricultural machines of modern origin. That we shall before long have highly efficient and economical steam ploughs in plentiful operation we have no doubt whatever, and we shall be but too happy, when the fitting time arrives, to record their successes. At present, however, we will restrict ourselves to the detailing of what has been effected with the more advanced machine—the reaper, the progress of which affords a new example of the invaluable results which are produced by the fostering care and enterprise of the Royal Agricultural Society of England.

As the average ratio of inhabitants to territory in the United States is so extremely low, compared with that of England, it is not in the least surprising that we are indebted to Americans for the only two kinds of reaping machines which promised to become permanent elements of our agricultural apparatus, viz., the machines of M'Cormick and Hussey, which first attracted attention in this country in the Great Exhibition of 1851. Each of these machines had been in use to some extent in the United States for fourteen or fifteen years, and for about six years had been very generally adopted. There are at present several other forms of reapers in use in the States, but all of them are based upon, and have sprung from, the essential principles of these two machines. No less than eight thousand reaping machines of various kinds are annually sold in that country; and, although the home demand for them here can never equal the American demand, yet the rapid increase of orders during the past two years promises a much larger sale than could have been anticipated from a comparison of the territories and populations of the two countries.

In order to ascertain for ourselves the truth or untruth of the statements made in various quarters respecting the demand in England, we obtained permission to visit the manufactory of Messrs. Burgess and Key (of Newgate-street, London) at Brentwood, in Essex, which is devoted exclusively to the manufacture of reaping machines; and on visiting it were not a little astonished at the magnitude of the operations there conducted, and the immense stores of finished machines, and machines under manufacture. Upwards of *seven hundred* were already in course of preparation for next harvest, and it is even now very doubtful whether the supply will not fall considerably short of the demand. At first, we were certainly unable to understand how it was possible for such extensive works to have been so speedily called into operation; and it was only by reflecting upon the fact that the M'Cormick machine, as improved by Messrs. Burgess and Key, has been used with complete success in France, Belgium, Austria, Hungary, Italy, Portugal, and Russia, as well as in England, Scotland, and Ireland, that the matter became perfectly intelligible to us. The object of such machines is, of course, to render farmers as independent as possible of the variations of the weather, and the contingencies of the labour market, and it is not surprising that, when the means of their independence are placed easily within their reach, many should avail themselves of them without hesitation or delay, especially when, by so doing, a saving of at least thirty per cent. of their harvesting expenses is effected.

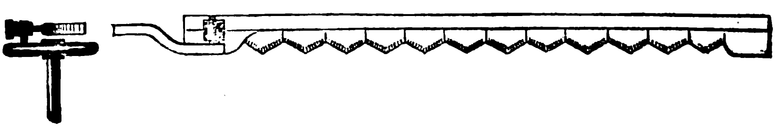
It would not, however, be consistent with our practice to indicate merely the extent to which the use of the reaping machine has now attained; we must notice briefly the nature of the two most prominent machines, and the differences between them. The knife of the Hussey machine consists of a series of long acute angular blades, each of which works through a correspondingly long slot in a guard or finger. The edges of the blades are smooth or plain, and, being driven at a high speed, cut the corn with a chopping action.

The corn is drawn on to the machine with a rake, by a man who has also to deliver it behind. The cut corn must be immediately bound or removed, to allow the machine to return. It will thus be seen that this machine, instead of rendering the farmer independent, leaves him subject to a double dependance, for without binders the machine cannot be worked, and if the machine fail from any cause the binders are rendered idle. This point deserves special attention, as it constitutes one of the chief defects of the Hussey machine, and one which is entirely avoided in the machine about to be described. The knife of the M'Cormick machine consists of a series of very short obtuse angular blades placed side by side, so as to form a cutting edge which does not depart very considerably from a straight line.* The whole of the cutting edges are finely serrated, after the manner of a sickle edge. The blades work through short slots, in guards or fingers, and, being driven at a moderate speed, cut with what is known as a "draw cut" in opposition to the chopping action of the Hussey knife. In the early M'Cormick machines, as made by the inventor, the corn was delivered at the side of the machine, by a man who rode upon it, and drew the corn off into sheaves, leaving a clear track for the horses to return over. In this machine, also, instead of the man having to draw the corn into the cutters with his rake, as with the Hussey machine, a large light revolving reel is used for the purpose, which, as the machine advances, draws the corn in to the knife with much greater regularity than can be attained by the rake, and with much less danger of knocking out the corn.

The foregoing description applies to the machines as they were exhibited at the Great Exhibition; and it may be within the recollection of our readers that several trials were then directed to be made with them, the result being that the Council medal was awarded to M'Cormick. Further trials subsequently took place, and resulted in the manufacture and sale, during 1852-3, of some thousands of the Hussey machine, whereas less than one hundred of M'Cormick's were made and sold. The success of the two machines, thus far, appears to have been the reverse of their success in America, and the fact arose, doubtless, simply from the difference in the weights of the crops of the two countries, which rendered a self-acting delivery for this country absolutely necessary. It was found that the humidity of this climate, together with the great length of our straw, rendered it next to impossible for the man to continue raking the corn off the side of M'Cormick's reaper for any great length of time. In cutting, however, it had this great advantage, that the knife would never clog in damp or foul crops, while the Hussey machines would only cut when the crop was dry. In America, where the climate is much more dry than ours, this would not be important; but with us crops are rarely dry until late in the morning, before which the Hussey machines could not, therefore, be satisfactorily worked.

As the M'Cormick machine stood until 1854, it was, therefore, so far as the cutting action is concerned, best adapted to the requirements of the English farmer. The side delivery of this machine was also invaluable, as, by it, the great defect of the Hussey machine before-mentioned, was altogether avoided; an improved mode of delivery, to render the machine self-acting in this respect, was the great desideratum; and, at the suggestion of the Royal Agricultural Society, various manufacturers gave this their special attention. Crosskill, who was till then one of the principal makers of the Hussey machines, then brought forward Bell's reaper, with shears for cutting, and an endless webb for delivering the corn when cut. This machine had lain dormant for many years. That it was not now successful will be seen from the fact that Crosskill subsequently discarded both the shears and the endless web, substituting M'Cormick's knife for the shears; and, for the endless web, three endless belts, having across their surfaces projecting pieces of wood, which delivered the corn at the side of the machine. In other respects this machine is too well known to need description here. The most prominent defect, and one which appears fatal to its adoption in this country, is its enormous draught to the horses (and, being driven from behind, only two can be attached at one time), which is shown in the following report of the engineer of the Royal Agricultural Society:—

* The exact form of the M'Cormick knife is represented in the annexed engraving, which has been



made from one of Messrs. Burgess and Key's machines.

Burgess and Key's	...... $2\frac{3}{4}$ cwt.	......	cutting 5 ft. 4 ins.
Crosskill's Bell	...... 4 „	......	„ 5 „ 4 „
· Dray's Hussey	...... 3 „	......	„ 4 „ 3 „

In the year 1854 Messrs. Burgess and Key, who were M'Cormick's agents in 1851, overcame the only obstacle in the way of the general introduction of M'Cormick's machine into England. In that year those gentlemen patented a platform furnished with revolving screws, by means of which the corn, as it is cut, is delivered at the side of the machine, with the straws at right angles to the path of the reaper, so that it simply requires binding into sheaves. The importance of this improvement cannot well be exaggerated, since by it the entire machine was made completely self-acting, requiring merely a lad to drive the horses. The chief improvement subsequently applied consists in the introduction of a revolving conical divider at the off-side of the machine, for dividing the portion of the crop to be cut from that left standing, and throwing it inwards towards the cutters. Beside this several minor improvements have been made in the details of the machine; but these, although of great practical importance, cannot well be described in this place. Three years' experience of the M'Cormick machine, as improved by Burgess and Key, has shown that it is now perfectly well adapted to perform all that is required of it in the field, both at home and abroad.

In confirmation of our high estimate of this reaper, and of our confidence in its superiority, we may state that, in the Judges' Report of the result of the trials at Leigh Court, it is said that this machine cuts a clear track of five feet six inches; that in every operation in which it was tested it exhibited a decided superiority; that it cut with great precision both wheat and barley, standing and partially lodged,—and, in cutting through weeds and grass, showed no tendency to choke; and that the *delivery* is peculiar to this machine, and is the principal and most important improvement effected since last year, the corn, on being cut, falling on a series of rollers, fitted with Archimedian screws, by which it is delivered in a continuous and well-formed swathe at the side of the machine. It is further stated that this delivery, being effected by the machine, dispenses with the attendant necessary in Dray's and Palmer's machines; and it was proved to be capable of cutting wheat and barley with no other attendance than a boy strong enough to drive a pair of horses. The draught, also, was said to be much lighter than that of any other machine, and the horses were not required to travel faster, or to exert greater power, than would be necessary in ploughing in land of medium strength. In the same Report it is said, that the superiority in cutting in this machine appeared to be the result of a larger stroke in the knife, equal to $5\frac{1}{2}$ inches; and the reduction in draught and speed the consequence of a more correct calculation and distribution of power. The Judges had no hesitation in awarding to this machine the Society's first prize of 30*l.*, and they felt assured that all who witnessed the trials would concur in that decision.

This award was confirmed, in 1857, at the Royal Agricultural Society's Meeting at Salisbury, with the additional observations, that the ease and accuracy with which Messrs. Burgess and Key's machine worked fully entitled them to the first prize, and that any remarks upon it would only be a repetition of the award at Leigh Court. This Report, which was unanimously signed by the eight Judges, and confirmed by their engineers, also alluded to the revolving cone before mentioned, "which caused all the corn it touched to be brought inwards, so that the corn was laid in a most perfect swathe."

After the Society's award was made, Mr. Clare Sewell Read, one of the Judges, made a tour of inspection in order to watch the practical operation of the several machines, and published in a contemporary a report of what he saw, which report was entirely and strongly in favour of Messrs. Burgess and Key's machine. One extract from it will be sufficient. After mentioning the name of John Hudson, Esq., of Castleacre, which is, as he says, "familiar to every British agriculturist," he gives the testimony of that gentleman, who has had great experience in reapers. Mr. Hudson gives the following reasons for preferring Burgess and Key's:—"It takes a wider cut; it goes easier for the horses; it can be worked in heavy dews and light showers from five in the morning till seven or eight in the evening, and will cut fourteen or fifteen acres a-day. It can be used on all kinds of grain, and the binding (if required) can be done at leisure. It has also an advantage which may be peculiar to West Norfolk. Women principally bind the corn; and, as they do not commence work till eight, Dray's machine cannot start till they are in readiness. It is difficult to so arrange the binders that each has just enough to do and none to spare......The side-delivery is happily not dependant on labourers, who generally look upon reapers with jealous eyes. Messrs. Burgess and Key's, for instance, lays the corn so evenly and well, that gathering it for sheaves is an easy matter. I saw a lad at Castle Acre with a barley fork lumping wheat almost as fast as he could walk."

It is not necessary to add here to these declarations of the excellence of the machine under notice, although we are tempted to do so by the testimonials of many of the first farmers in England now before us. We think, however, it may not be amiss to add the following passage (which is interesting in more respects than one) from a letter written to Messrs. Burgess and Key by the well-known Baron Bettino Ricasoli, dated Barbanella (near Grosseto), Tuscany, June, 1857 :—

"On the 25th inst.," says the Baron, "we had the first trial of your reaping machine, in presence of the chief landowners of this country. The machine worked for six hours with such precision of motion and such perfect firmness, that every one there was struck with astonishment. We may now, therefore, congratulate you on so favourable a result, and I do so truly with my whole heart, the more, as the machine, although left in our unskilful hands, has continued to perform its functions as perfectly as on the first day, while the surprise and satisfaction excited on that first occasion have been kept up even among those who beheld this remarkable machine at work for the second and third time. I am now reaping with the two machines, and I daily receive numerous visits from different people, who never tire admiring the perfection of the cutter, which shaves like a razor, and the ingenious system of those spirals, by means of which the corn is heaped on the surface of the field better than any human reaper could arrange it. The Agricultural Society of this province, who, at my invitation, were present at the first trial of the machine, wrote a testimonial of their entire satisfaction......The Grand Duke and Government have pretty extensive possessions in this locality, and I am urging upon their stewards the advisability of adopting your machine, and I think I shall succeed in persuading them."

Our remarks in this article have been mainly directed to the machine of Messrs. Burgess and Key, as our readers will observe, and the reason is, that, according to the best information which we have been able to obtain, this is the reaper which is destined to make the most speedy progress in this country, both for home use and for exportation. We have before us the testimony of men of the highest standing in agriculture to the effect that by the aid of the machine a harvest can be cut and gathered in at considerably less cost and in less time by one-half than are ordinarily expended upon the operation. When the extreme variableness of our climate is considered, the immense advantages thus gained will be readily understood. As compared with the other machine, it has the advantages of cutting the same width with thirty-five per cent. less draft; of working well, whatever be the pace of the horses; and of enabling the farmer to reap with oxen, which are frequently employed to work it in the south of Europe. Whereas, the Hussey machine must be worked at a high speed, to enable the blades to *chop* the corn effectually. Even in the Bell machine, to which the M'Cormick knife is applied by its manufacturer, there is a considerable liability to choke in damp or foul crops, in consequence of the angle of the blades being much more acute than in Burgess and Key's machine. This arises from the fact that the arrangement of the parts of the Bell machine will not admit of a very high speed being imparted to the knife, and the deficiency in speed has to be compensated for by increased length in the blades.

In conclusion, we refer our readers to the engraving on the first page of this Number, in which the M'Cormick reaper, as finally improved by Burgess and Key, is illustrated; Fig. 1 being a perspective view, showing the machine as viewed from the left front of it; and Fig. 2 a similar view, showing it as viewed from the right rear of it. *a*, is the suspension bar; *b*, the reel post; *c*, the outside wheel of the frame; *d*, the middle piece of the frame; *e*, the main wheel; *f*, the stop board; *g*, the spur wheel; *h*, the reel; *i* and *j*, pulleys on the reel shaft; *k*, the reel bearer; *l*, a kind of ratchet brace; *m*, a pulley in connection therewith; *n*, the back bearer; *o*, the reel bearer pulley; *p*, a combined pulley and bevil wheel; *q*, the dividing cone; *r*, the divider points; *r'*, lifting gear for altering the height of the cutters (comprising a lever trigger, lifting rod, ratchet quadrant, and two connecting bars); *s*, the first platform delivering screw; *s'*, the second; *s''*, the third, *t*, a small drum on the first screw; *u*, a large drum on the frame wheel; *v*, the back board of the platform; *w*, its middle board; *x*, its iron side; *x'*, its wooden side; *y*, the finger beam; *y'*, the fingers; *z*, the angle board; *e'*, the small wheel side; C, suspension rods and chains; S, a stay; W, the land wheel and quadrant for ditto; *o'*, the regulating screw. Our readers, who are accustomed to machinery, and know, from our previous remarks, the objects of the several parts of the reaper, will readily understand their action without further explanation.

THE PATENT LAW AND PATENT OFFICES.

THE antipathy which we have previously expressed to the Patent Bill, brought before the House of Commons by Mr. Duncombe, and the satisfaction we felt at its unceremonious rejection, arose less from opposition to the provisions of the Bill than from contempt for the manner in which it was originated. It is sufficiently painful for men of proved respectability and long standing, to know that their profession is daily disgraced by a crowd of incompetent and (some of them) unprincipled persons, who hang and prowl about its outskirts; but it would be much more painful should these invidious individuals, by misguiding a credulous metropolitan Member, manage to meddle with the law and Legislature of the land, and indirectly bring discredit upon the profession itself. We are not acquainted completely with the origin of Mr. Duncombe's Bill, but we know that there is just now an obscure and motley crowd of persons calling themselves "patent agents," and we very strongly suspect it was from among these that the measure in question proceeded. Certainly the Solicitor-General imputed its introduction to patent agents, and as certainly the only firms justly entitled, by experience and position, to the designation, never showed it the least amount of favour, and only refused to oppose it because of the just contempt which they entertained for its promoters. Neither Messrs. Carpmael, Messrs. Newton, nor ourselves—firms which have all existed for more than thirty years—are in the smallest degree responsible for the Bill, or willing to accept any part of the discredit resulting from its introduction.

It would be an easy matter for us to present to our readers a curious chapter connected with the motley crowd of *quasi* patent agents before referred to, and we may ere long, do so; but at present we will content ourselves with cautioning our readers against entrusting their interests to unknown, inexperienced, and needy individuals. The attainment of a patent for an invention involves professional transactions which can only be efficiently and securely carried out by men who are educated, skilful, experienced, and far above all suspicion of charlatanry or empty pretensions; and we recommend patentees, if they wish to have valid patents secured, and specifications drawn in conformity with the practice and the requisitions of the courts of law, to carefully avoid committing their business to the hands of men who resort to any kind or degree of deception or quackery; otherwise they will, in all probability, have much cause to regret their heedlessness.

The main provision of Mr. Duncombe's Bill—or, rather, of the Bill which has been called Mr. Duncombe's—is, that the fees paid on obtaining a patent should be reduced one-half, and Sir John Shelley advocated the adoption of the measure on behalf of *poor inventors*. Now, we certainly should wish to be found among the last to oppose any measure for the relief of the poor, whether inventors or not, providing that such measure were necessary, and really calculated to serve its purpose, without introducing concomitant evils. But we strongly doubt whether a reduction of the fees on patents, in their early stages, is really necessary, and capable of doing real service to the poor; and we as strongly doubt whether that reduction would not have the effect of rendering Letters Patent for Inventions mere means of advertisement, and, too often, of puffery. The opinion of persons most competent to form a judgment upon the subject is that the fees are already, under the Act of 1852, quite as low as they should be, and that to reduce them more would be to go far towards rendering all patents much less valuable than they are at present.

There are, we are aware, persons who believe that inventors have a right to the protection of Letters Patent at the lowest possible cost; in other words, that no revenue for State purposes should be derived from the fees paid by them. But we really cannot coincide with them in this. They have many privileges for which they may justly be expected to pay a consideration. They should remember, for example, that the monopoly granted to a patentee often deprives the public of the benefit of an invention for several years; for an improvement is frequently made by two or more persons at a distance simultaneously, or nearly so, and he who first obtains protection for the improvement is empowered to prohibit another who has also invented it both from using it himself and from presenting it to the public. We might add many other facts, but they need not here be stated, because the fees are already so low that no great amount of revenue is obtainable from them.

The truth is, the law in regard to these fees must and should be regulated by the manner in which the existing system is found to work. And, if we mistake not, the real grievance of which patentees themselves will complain is to be found, not in the early fees, but in those which have to be paid after the patent has existed three years, and in those which will, after 1859,

have to be paid at the expiration of seven years. The third year's fee is 50*l.*, and the seventh year's will be 100*l.*, and we shall not be in the least surprised if a strong expression of feeling is occasioned by the falling due of the latter sum after the year just mentioned. At the same time we think it not at all unlikely that the Commissioners will, before that period, consent to a reduction of these after payments. A single payment of 50*l.*, at the end of the first *five* years, is what we think would be found sufficient, and at the same time perfectly satisfactory to the patentees themselves.

At present, however, there is one great object which may fitly absorb the yearly surplus fund, viz., the provision of a National Patent Office. In reference to this subject the Solicitor-General, in opposing the Duncombe Bill, said :—

"Up to the present time the Patent Commissioners had paid an annual rent for offices, but they were about to be taken away, and the Commissioners would be obliged to build new offices. It was also considered desirable by the Commissioners that there should be a depository provided, in which the models, which were daily increasing, might be exhibited to workmen and artificers, and that a library should be opened where specifications of the patents of this and foreign countries might be accessible to them. For these objects the Commissioners meant to apply to the Treasury for leave to use the present surplus of 7,360*l.*, and the surplus which might accrue from year to year, and they had been offered a piece of ground, part of the site of the South Kensington Museum, where it was proposed to erect their new buildings. The amount of the present fees was not excessive, and the amount of the surplus would be applied to the benefit of inventors, and inventors alone. Although he had spoken of a library and museum, it must be understood that the Patent Commissioners did not conceive that any great expenses would be required, or that the surplus of a great number of years would be absorbed; but, on the contrary, it was their desire that the works should be as simple as possible, having regard to the objects for which the building was intended. The expenditure could not take place without the control of Parliament, because the whole of the fees were paid into the Consolidated Fund, and Parliament voted annually every shilling of the expense."

As many of these remarks as relate to the contemplated establishment at South Kensington afford us, we must acknowledge, no pleasure whatever. What is South Kensington to inventors, or to any one but Prince Albert and his satellites?—who, so far as we are aware, are not very great patentees. It is a central building for the business offices, near the site of the present office, that is imperatively needed; and it would be well to defer the erection of the Kensington place of amusement,—if such a place must be had, to pacify illustrious amateurs,—until that building is provided. It is much to be regretted that the premises in Southampton-buildings, now occupied in part by the Patent Office and Library, cannot be hired or purchased, and wholly appropriated to the same purpose; for no less than 5,000*l.* have been expended from the Patent Fund in adapting them to their present uses. But on inquiry we find the Lord Chancellor considers it essential that they should be handed over to the Chancery Accountant-General, and that the Patent Commissioners should find accommodation elsewhere. As we must, therefore, incur the expense of a removal, let us see to it that a building worthy of inventors, and of the exalting influence which invention exerts upon this nation, is now obtained. Let us see an edifice erected adapted to the extent of the business to be transacted; large enough to receive the magnificent museum and library in the splendid nucleus of which Mr. Woodcroft and his subordinates at present lie buried; and beautiful enough to command the admiration of inventors from whatever quarter of the world they may come. At present the Patent-office of London is a deep disgrace to us as a nation, when it is compared with the noble structures of Washington, Paris, and elsewhere. This disgrace can only be done away with by the erection of such a building as we have indicated.

Nor must this office be situated very far west. It must be near the great business offices of the law, and readily accessible to men of business. Why not, for instance, adjacent to the new Record-office, where there is the needful space? And, beside this, there would be a decided congruity between the objects of the two offices. The remarks of the Solicitor-General may induce some to think that we are to be handed over bodily to South Kensington. But we are too indifferent courtiers to desire this honour. When we have to transact Patent business, or to examine models of machinery, or to make researches in a scientific library, we are not anxious to have the glances of the great upon us. "Work is work," as we all say sometimes; and we would rather do it conveniently,

within the dinginess of the City, than very inconveniently amid the splendours of the West. We will not be too scrupulous in scrutinizing what is done for others at Kensington if we are allowed to do worthily what we do for ourselves here. We do not, however, imagine for a moment that the Solicitor-General intended to convey the impression which his remarks, as we have said, may bear. We need not fear a painful, though splendid, transportation. The great point to be gained is, the construction of a building worthy of its objects; and in order to secure this we must see that the surplus fund is not used up in providing an outlandish exhibition for courtiers and exquisites in the far, far west.

We are encouraged to hope that a just and proper course will be taken in this matter, should Lord Derby's Government continue, for the new Lord Chancellor and his colleagues in the Patent Commission evince an earnest desire to ascertain what is really necessary to be done, and we do not for a moment doubt their willingness to do it. For this reason we wish them a long term of office.

THE ATLANTIC CABLE.

The experiment, although an unsuccessful one, which was made last year to submerge the Atlantic cable, served to show, nevertheless, that, with proper appliances, the thing was practicable. Whether the experience then acquired has been since satisfactorily turned to practical account, in the improvement of the paying-out apparatus, will shortly appear. The engineering talent which has been brought to bear upon the subject, and the enormous mass of opinion which has been offered, analysed and digested, in reference to a matter apparently so simple, would almost lead to the entire abolition of doubt on this head. The solution of this problem, however, will give rise to another of much greater magnitude; viz., what will be the degree of efficiency of the cable after it shall be laid?

However various may have been the opinions upon the first problem, they are still more diversified upon the second; its purely scientific character affords more room for speculation, and the unscientific, the pseudo-scientific, and the hyper-scientific have alike volunteered predictions as varied as the phases of the moon, but not half so definite in their character. Whilst the press teems with statements of the most conflicting nature, even though they assume the air of semi-official communications, it is difficult to discover what really has been, or is at all likely to be, accomplished in the way of successful operation. The Atlantic cable is at present an enigma which will be solved only when the commercial world has an opportunity of becoming acquainted with it. One writer states that messages can be conveyed at the rate of four words per minute; another outstrips this speed by quadrupling it; a recent writer in the *Times* says that, by this magno-electric instrument, eight words per minute have been transmitted; and a still more recent article in the *Plymouth Journal* gives one word per minute as all that can be accomplished without the use of abbreviations or signal codes.

This last writer also states that it requires at least two seconds for the transmission of a single signal, in consequence of the disturbing influences of the induction; and, since many letters are composed of three and four signals, it follows that eight or ten seconds are sometimes required for the perfect indication of a single letter. It is very likely, however, that one writer alludes to the literal spelling of words, whilst others refer to the abbreviated codes, in which case they mean different things.

With regard to the relation between the cable and the electro-motive appliances, one states that the conductor of the cable is too small; another, that it is even too large; a third says that it should be iron, and not copper. One says that the cable is too heavy, another that it is too light. The electrician of the Company has invented enormous induction coils, arranged expressly to excite great quantity with comparatively low intensity, which are used in single or double pairs, and excited by gigantic Smee's batteries, weighing, with their suspending gymbals and troughs, some tons, and some idea of the power of which may be formed when it is stated that the silver plates alone are worth nearly 3,000*l*. When the length and thickness of the conductor of the cable are considered, in relation to this enormous electric generator, there truly does seem a disparity between the means and the ends, and therefore it is not surprising when another writer states that such a quantity current chokes the wire, and that one of Mr. Henley's magno-electric machines, which generates an extremely small quantity of electricity at a very high intensity, has been able to work freely through the cable, when a current of great quantity and less intensity completely failed.

Are there no scientific data to guide these experimentalists? Are the laws of the relation between electro-motive force and resistance still undefined, or rather has the whole apparatus been got up in a hurry without first testing carefully the value of each separate arrangement and its perfect adaptability to the others? The cautious vagueness of the official scientific reports would lead to the last conclusion; and the great number of complicated apparatuses which have been contrived for adapting the various elements to each other, without realizing a result at all commensurate with so gigantic an undertaking, evidently show that the arrangements are by no means complete, and the difficulties attendant on the practical working of the scheme far from being surmounted. The effects of the induced static charge appear, in this extended line, to have grown to an unprecedented extent, and the class of phenomena to which they have given rise seem to require either the adoption of an entirely new arrangement of cable; or of a class of electro-motors which shall be able to transmit a dynamic current without communicating a static charge that will be capable of producing any disturbance by its discharge; or, thirdly, the employment of relays and apparatus which shall be affected by the dynamic current only, and not by the static discharge. Perhaps a general alteration in the whole of these elements, having these three objects in view, will be ultimately adopted. Success with the first cable is hardly to be expected; and it is possible—nay, even probable—that the phenomena which may be discovered in working through the cable in an extended line may be very different from those which present themselves in experiments with the whole compactly coiled together.

It would be easy to point out many objectionable features in the cable, as well as in the apparatus employed, but these are gradually becoming recognized by those concerned in investigations with them. It is to be hoped that the ample funds of the Company will, at length, enable their scientific staff, some of whom would rather, apparently, work their way through the untried labyrinth of experiment, than proceed upon the well-ascertained laws of electrical science, to realize all that the spirited adventurers deserve.

The time is at hand when their experience will be put to the test; already the cables are stowed—the silver plates of the Smee's batteries have been discarded for gas carbon plates—the apparatus, instruments, batteries, &c., are all packed ready for embarkation, and in a few days the ships, with their costly and deeply-interesting burden, will depart into deep water, there to commence the experimental trials, which will soon after decide the fate, at all events, of the present cable.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—The time is now rapidly approaching when the submergence of the Atlantic cable will be again attempted. A second failure (should such unfortunately be the result) will have a seriously prejudicial effect upon projects of the same nature, and will, probably, postpone for some time any further attempts of the same magnitude.

The probability that this will be the case is enhanced by the publication of late in the *Times* of more than one article, wherein it is sought to convey the impression that the present arrangements for submerging the cable are all that the highest engineering and mechanical talent can desire.

It was stated, in one of the articles in question (see *Times*, April 28), that the paying-out machinery "has been daily inspected by the chief engineers and mechanists in the kingdom, whose criticisms and suggestions for improvement were freely invited; but, up to the present time, no suggestion affecting either the principle or working of the machinery has been made, and it is generally considered that, as far as the rather limited experience on the subject of laying down deep sea cables extends, the whole apparatus may, at present, be regarded as perfect."

Now, when the Directors of the Atlantic Telegraph Company announced their intention of inviting engineers to inspect the machinery in question, the *Times* thought proper to criticise very severely such announcement, and I therefore thought that, having given publicity through its columns to the statement contained in the passage above quoted, equal publicity might be given to, at least, one protest against the inference contained therein.

I therefore addressed a letter to the editor of the *Times*, stating that I, for one, did not agree in the high eulogium passed on the machinery, and pointing out some of its defects. This letter having been refused insertion, I trust that you will do me the favour of allowing me to lay before the public, through your columns, a few observations upon the important subject.

And, first, let me say that I do so in no spirit hostile to the Atlantic Telegraph

Company. I admire the grandeur of their undertaking—I feel a deep interest in its success—but I feel a still deeper interest in the cause of Ocean Telegraphy, which I cannot but see is jeopardized, and likely to be seriously injured by the most hazardous and critical experiment which is so soon to be made. I see defects in the present arrangements which may lead to fatal results, and therefore it is that, having taken a somewhat prominent part in the late discussions on this subject at the Institution of Civil Engineers, I wish it to be known that I have in no degree modified the opinions I then expressed, viz., that the operation is fraught with danger and difficulty; and I regret to add that this danger and this difficulty are by no means met, to the extent they might be, by the present arrangements.

Above all, I am anxious that the idea should not go abroad that engineering skill has been exhausted—that no more can be done—no improvement suggested, and that by the result of this experiment submarine telegraphy in deep water and for long distances must stand or fall.

After describing the nature of the apparatus and break—which, as a break simply, is an admirable contrivance—the writer in the *Times* goes on to say,—"The chief beauty of the new machine is, that, while nothing can add to the fixed strain of the breaks, any one—no matter who—can in a moment ease them as much as he thinks necessary." And again,—"The officer in charge of the apparatus, watching the register of strain, opens the break by the slightest movement of his hand, and lets the cable run freely as the strain rises. The same officer, however, cannot by any possible method increase the actual strain on the cable, which must always remain according to the friction at which the break is first adjusted by the engineer."

Now, what is here termed the chief beauty of the machinery is in reality a serious defect. If the depth of the water were always the same, and the surface always smooth, it might be *convenient* to have an apparatus with such properties as are above described. The strain required to lay the cable in a given depth along the bottom, free from tension and slack, is a constant quantity, and, therefore, it might be convenient to have an apparatus by which that strain could not be exceeded.

But the sea is neither uniformly deep nor superficially smooth.

In the first place, it is not uniformly deep. The vessel may be going steadily forward and the cable paying-out regularly in 500 fathoms of water. This requires a strain of about 7 or 8 cwt., and to this we suppose the break has been adjusted: but let the depth rapidly increase to 1,000 fathoms—what is the result? The breaksman is powerless; the cable shoots away with an accelerating velocity, and he has no power to check it. He can take off the strain of the break, but he cannot increase it by a single ounce. All he can do is, to call some other officer, who must go to the break levers, and put on additional weights. In the mean time, the cable is rushing out and acquiring a high velocity and consequent momentum. This is to be checked and reduced to its natural state. To do this safely the force on the breaks should be *gradually* increased; but this is just what cannot be done. The increase by weights applied to the break levers is an increase *per saltum*, and as such cannot but be productive of danger. What is required is, a means of gradually increasing the restraining effect of the breaks to meet any increase of depth, and this should be at any moment at the command of the breaksman. This is what the present arrangement does not afford, and therein lies, in my opinion, one of the great defects in the principle of its construction.

In the next place, the sea is not superficially smooth. The rise and fall of the surface of ocean waves frequently amounts to 30 or 40 feet, and the vertical motion of a ship's stern probably somewhat exceeds this. Besides this, there is the pitching of the ship itself, causing sudden rises and falls, independent of the regular ocean swell. Whilst the stern is rising, an increased quantity of cable is required; and whilst falling, the contrary is the case. Consequently, the rate of rotation of the paying-out apparatus is variable; and, as the rotation is caused by the cable, it follows that the strain on the cable, or the tension, must also be variable.

This variation of strain is directly as the weight of the rotative part of the paying-out apparatus, directly as the rise of the stern, and inversely as the square of the time in which the rise takes place. Consequently, with a heavy paying-out apparatus and a sudden pitch of the vessel, a very heavy strain may be brought on the cable. This strain is quite independent of the break, and arises from the inertia of the rotative machinery.

On the other hand, during a portion of the oscillation of the vessel, the demand for cable is less than the amount given out by the drums, which have then acquired a velocity above the normal velocity. This might be met by the breaks, had the breaksman the power of increasing their action;

but this he has not, and the result will be, that on every such occasion the cable will make a shoot away, which will have to be checked soon after by the inertia of the apparatus.

These variations of strain may, in the case of a heavy paying-out apparatus, like that under consideration, become very serious. I did my best, during the late discussions at the Institution of Civil Engineers, to impress upon the gentlemen connected with the Atlantic Cable their importance, but I do not see that they have considered them of sufficient consequence to require any provision for neutralizing them in the paying-out apparatus.

The effect of inertia is certainly difficult to counteract; but, although it cannot be entirely overcome, it may be mitigated by the careful manipulation of an intelligent and vigilant breaksman, provided he has at his command the means of gradually increasing or diminishing the action of the breaks from time to time as he might find it necessary. This, as has already been explained, he has not with the present mechanism.

I trust that I have said enough to justify me in dissenting from the opinion expressed by the writer in the *Times*. There are other points open to objection, but I have already trespassed largely on your space, and must draw to a close.

In doing so I take the opportunity of again repeating that the question of ocean telegraphs must not be judged by the result of the present attempt. Like all new undertakings of magnitude, there has been much to be learnt, and great allowances must be made for those upon whom the management has devolved. They have, doubtless, made mistakes, and serious ones. The great specific gravity of the cable and the smallness of the conductor are errors which, perhaps, I may say, they *ought* not to have fallen into. The former has involved them in the ponderous paying-out apparatus with its complicated breaks, and renders highly hazardous the operation of submerging. The latter will seriously impair the efficiency of the line when laid, owing to the great retardation caused by induction. Still, let us hope for the best, and should, unfortunately, another failure be met with, let us not be discouraged, for, by the adoption of a cable of light specific gravity, and duly proportioned conductors, there can be no doubt whatever of the ultimate success of ocean telegraphs.

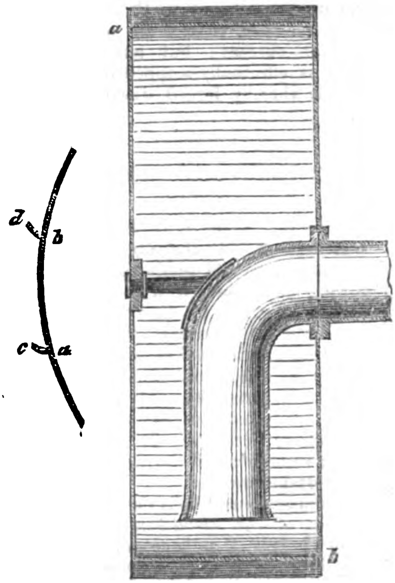
I am, Gentlemen,
Your obedient servant,
JAS. A. LONGRIDGE.

18, Abingdon-street, Westminster,
May 15, 1858.

HOLLAND'S REVOLVING ROSE OR STRAINER FOR SUCTION PIPES.

MR. J. SIMON HOLLAND has lately invented, and kindly forwarded us for publication, a description of a revolving rose or strainer, which may be applied with great advantage to the suction pipes of pumps of every description, wherever such pipes are liable to become choked. The common roses or strainers applied to suction pipes, being continually immersed in water which is more or less foul, frequently have to be removed and cleansed, and the pumps are thus for the time being exposed to the choking action of chips, waste, &c., especially on board ships. We need hardly explain that the result is likely to be very injurious, particularly when, as is often the case, the condensers are supplied from the well or hold, on the water accumulating there in too great quantity. The object of Mr. Holland's invention is to render it unnecessary ever to remove the rose or strainer, and for this purpose he makes it in the form of a drum, as shown in the annexed engravings. The drum, Fig. 1, is

Fig. 2. Fig. 1.



finely perforated all over, and is supported upon an axis about which it may be turned when it is desired to clear the immersed portion from the choking matters accumulated upon it. By turning it a fresh portion is brought below the water, and the straining continues as before. Mr. Holland puts curved blades (shown separately in

Fig. 2) on the outside of the drum's circumference, which blades will scoop or carry up such material as fine coal, for example, which often accumulates near the suction pipes of pumps in steamers, and it may then be scraped off and removed. The form of the strainer may of course be varied.

We believe this to be a very useful invention, and engineers are, we think, much indebted to Mr. Holland for having freely made it public.

WETHERELL'S PATENT APPARATUS FOR PREVENTING DOWN DRAUGHTS IN CHIMNEYS.

Mr. H. Wetherell, of Upper Chapman-street, St. George's East, has introduced a singular, but very efficient apparatus for the above purpose. It consists of a valve and valve-seat made and acting as hereafter described. He fits a seat in metal or other suitable material at any desired height in a chimney or flue, and above the seat suspends a ball filled with some gas lighter than atmospheric air. The ball offers no impediment to the passage upwards of smoke, vitiated air, or any other ascending current; but any descending current is effectually stopped by the valve, which is thereby forced down on to its seat.

DIMENSIONS AND WEIGHTS OF BELLS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—As the subject of bells is so much before the public at present the following particulars, with the accompanying table, may not be unworthy of a place in your admirable journal. They are translated from a book published at Berlin in 1827, by F. Triest, and are the results of numerous experiments. They may prove of some use to bell-founders, and may serve as a guide to purchasers by enabling them to form some idea of the size of a bell to give a certain note, &c.

The dimensions of bells depend upon the thickness of the *sound-bow* (the thickest part of the bell), the diameter at the mouth being, in general, 15 thicknesses; the diameter at top half of that; and the height 12 thicknesses. The metal in these experiments consisted of four parts copper and one tin. At half the height of the bell the thickness diminishes to about one-third of the thickness at sound-bow.

Long ago I gave a copy of the above to Mr. Denison, Q.C., and also one to Messrs. Warner, to show what was the general rule in Prussia, where bell-founding is better understood than in most countries; but in the late "Big Ben" these proportions were a little departed from, and, perhaps, with some advantage.

I am, yours, &c.,

Wm. Taylor.

73, Oxford-terrace, May 5, 1858.

A Table showing the greatest Diameter and Weight of a Bell of any given note through three octaves.

Note.	Diameter.			Weight in Pounds.
	Ft.	In.	Lin.	
C	10	8	...	44,800
C#	10	2	8	39,552
D	9	6	...	31,424
D#	8	10	8	25,920
E	8	6	4	22,912
F	8	...	...	18,880
F#	7	5	8	16,064
G	7	1	4	13,248
G#	6	8	...	10,880
A	6	4	8	9,669
A#	5	11	...	7,680
B	5	8	...	6,784
C	5	4	...	5,600
C#	5	1	4	4,944
D	4	9	...	3,928
D#	4	5	4	3,240
E	4	3	2	2,864
F	4	...	...	2,360
F#	3	8	10	2,008
G	3	6	8	1,656
G#	3	4	...	1,360
A	3	2	4	1,208
A#	2	11	6	960
B	2	10	...	848
C	2	8	...	700
C#	2	6	8	618
D	2	4	6	491
D#	2	2	8	405
E	2	1	7	375
F	2	...	...	295
F#	1	10	5	251
G	1	9	4	207
G#	1	8	...	170
A	1	7	2	151
A#	1	5	9	120
B	1	5	...	106
C	1	4	...	87

The weight is in Nuremberg pounds; the measures in Rheinland feet, inches, and lines. A line is the twelfth part of an inch. The weight of the clapper averages about 2½ pounds, or rather more, to every hundredweight of the bell. The diameter of ball is to the thickness of sound-bow of the bell as 5 to 3.

THE GUN-BOATS AND DESPATCH VESSELS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I am not disposed to enter upon a controversy with Mr. T. White with regard to the despatch vessels and gun-boats. I may, however, be permitted to remark that I quoted an authority at least equal to Mr. T. White's with respect to the engines.

As to the beauty of those vessels, I have a model of one of the despatch vessels now before me, and I do not hesitate to pronounce the form beautiful. I cannot defer to the taste of Mr. T. White, whose sense of the beautiful is amply developed in the terms of his criticism.

The constructor of the small gun-boats aimed at stability and fitness for service in shallow water, creeks, and rivers, and at celerity of varied movement or handiness rather than continuous rectilinear speed, and he has been pre-eminently successful. Mr. T. White has his *beau ideal*, and their form may not harmonise with it; but symmetry and fitness are blended in them. They are not yachts, and would be very ridiculous things if they were anything like yachts.

The builders of those vessels lost heavily by their contracts. Mr. T. White has no sympathy for them. He cannot have that "fellow feeling" which "makes us wondrous kind." *He* has *not lost* by contracts with the Government.

Professional men differ with regard to the propriety of hauling these vessels up. There appears to be a tolerably unanimous opinion that (whether it ought to have been done at all or not) it has been done in an objectionable manner. But Mr. T. White seems to be too deeply interested in the matter for his judgment to be unwarped; and, while I demur to his dictum, I refrain from discussing the subject lest I should wound his feelings, which I should be sorry to do.

I am, Gentlemen, yours, &c.,

NAUTICUS.

STEAM-SHIP PERFORMANCE.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Mr. Atherton is indefatigable. Again he recommends us to measure the merits of steam ships by the formula $\frac{V^3 D^{\frac{2}{3}}}{I H P} = C$, and to record the coefficients. But the obstinate proprietors will not recognise his services, or adopt his plans.

Cui bono? they exclaim. Strange men, there is no persuading them. Some, indeed, have dared to say that the *test* has been *tested*, and proved to be useless. He must console himself, if they will not be convinced they have not his disregard of their interests to blame for it, some people will not be benefited even by the most self-denying benefactors.

I myself have been rather perplexed by two steam-ships. I will state particulars.

A has Displacement 1728 Tons.
Power . . 1000 I H P.
Speed . . 12 Knots.

Of course I try her by the formula as follows:—

$$\frac{12^3 \times 1728^{\frac{2}{3}}}{1000} = 249 = C.$$

B has Displacement 2415 Tons.
Power . . 1250
Speed . . 12 Knots.

I also apply the formula here—

$$\frac{12^3 \times 2415^{\frac{2}{3}}}{1250} = 249 = C.$$

Both alike! We will place the two accounts in juxtaposition.

	Knots.	Tons' Displacement.	I H P
A	12 speed.	1728.	1000 Power.
B	12 „	2415.	1250 „

Power increased $\frac{1}{4}$. Displacement increased about $\frac{2}{5}$. Speed the same. There is nothing like identity here.

In the counting-house they say the steamer B pays, and A loses, and it really is of no use to argue about Cs with men who measure everything by *l. s. d.*

But is there no mistake in the speed? It will be well to examine. $D^{\frac{2}{3}}$ is the element of the formula which represents the resistance.

		Ratio.
A.	$D^{\frac{2}{3}} = 1728^{\frac{2}{3}} = 144$ . .	1
B.	$D^{\frac{2}{3}} = 2415^{\frac{2}{3}} = 180$ . .	$1\frac{1}{4}$
A.	1000 I H P	1
B.	1250 I H P	$1\frac{1}{4}$

The requirement which $D^{\frac{2}{3}}$ would indicate has then been complied with. I H P has been supplied in the ratio of the "square of the cube root of displacement."

It would appear, then, that $D^{\frac{2}{3}}$ is either a false measure of resistance, or that the coefficient it co-operates in producing is fallacious.

If common sense be appealed to, its dictum is this—"The dynamic test of a steam-ship requires neither root nor power of D; but, *speed being the same, the greatest displacement with least power gives the best ship.*"

I am, Gentlemen, yours, &c.,

NAUTICUS.

INVENTORS AND THE GOVERNMENT.

GENTLEMEN,—I am indebted to your correspondent, whose letter appears in No. 1812, for calling my attention to the injustice of the Government and inventors.

I am quite aware of the *organized* opposition which inventors experience for daring to discharge a duty to the country by inventing improvements for any branch of the public service, more particularly that of the Admiralty and Ordnance, to which he calls my attention; and if I were to publish all I have the power to substantiate by evidence attached to *both branches of the service*, without seeking for evidence unconnected with the Government, the *Mechanics' Magazine* for the next twelve months would be literally filled.

In compliance with your suggestion, Gentlemen, I have had a *practical* discussion at the Admiralty relative to the invention alluded to, but I regret to say it gave me no hope of anything in the shape of justice, should I take further steps unsupported by that *peculiar kind of patronage required to secure success;* and, as I have no disposition to seek any class of patronage not strictly in keeping with the *merit* of invention, I considered it advisable for the present not to proceed further; in fact, other more pressing engagements forbid that I should waste my time and money in trying to effect what may be considered a moral impossibility till the Government shall feel it to be its duty to give up the practice of "*burking*" inventions, as so appropriately called, through its subordinates, who know well on what invention they are required to give a favourable report *by the particular way it is placed before them.*

Your correspondent's allusion to the Government victims—Drake, Norton, Carpenter, Cort, Whitworth, Blakely, and others—should be a warning to inventors how they act while the patronage system continues unchanged. And it will be well for the country if the patrons of legitimate invention will adopt some course calculated to destroy the covert and deep-rooted evil so notoriously placed in the path between justice and favour. We have several Institutions which profess to give encouragement to inventions, but it is a sad encouragement to tell a man that it is his duty to invent for the benefit of the State, and allow him to be ruined by the very persons whose duty it should be to see that his exertions are appropriately attended to. But I fear neither at the Admiralty nor the War-office is there any real improvement as yet determined upon by which inventors can feel justified in resting their claim for reward upon the bare merits of what they submit.

NEPTUNE.

FOG SIGNALS.

GENTLEMEN,—A new "fog signal" will not sound strange to those who have so often witnessed the fact that the simplest and most effective method of doing a thing is frequently the last found out. A train is brought to a stand, and the guard goes back to arrest the attention of the engineer of an approaching train. Two ways have been proposed for the purpose—one appealing to the eye, the other to the ear. I propose to appeal to the feelings of the engineer by placing two or three small wedges on the rail. The effect will be different from that produced by any other shaped small obstacle, and will be such as to arouse the engineer even from a slumber. If we should wish to arouse a sleeping man in a house on fire, we should shake him in preference to any other method, if we could get near him. We should appeal to the strongest and acutest sense, by instinct, as it were.

The wedges should be about three inches long and half-an-inch thick at the head, with a lead clip through them for fixing to the rail. They could be kept in a small "rack" close at the guard's hand. They could not get out of order, and might be used over again indefinitely. The gradual rise of one end of the axle, and then the sudden fall, even though only a quarter of an inch, repeated two or three times, would produce effects which the engineer could not mistake. Those who are fond of complexity could, if they thought proper, add explosive signals to go off at the same time, and also ignite and liberate lights of various colours. They might appeal to the sense of smell also, as the present explosive fog signals do, to the great annoyance of the passengers. The effect of wedges would be as great in a tunnel or when a train was passing as under other circumstances.

I am, Gentlemen, yours truly,

J. SIMON HOLLAND.

DEATH OF LADY BENTHAM.—It is not without emotion that we have to record the death of Lady Bentham, the relict of the late Brigadier-General Sir Samuel Bentham, the renown of whose genius as an inventor is world-wide. The deceased lady, who had nobly spent her long widowhood in perfecting the records of her illustrious husband's inventions, died on Tuesday, the 18th inst., at her own residence. So valuable have her labours been, that her name has become almost as widely known as Sir Samuel's, and the two will be honourably associated for ever.

THE FIVE SHILLING PIECE.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—There are but few persons who like to be troubled with one of the above, and some two or three suggestions have been published for an alteration of this awkward coin—one being to use a silver piece, size of half-crown, and insert in centre gold to the required amount; another, to make the coin entirely of the precious metal. The objection to the first is, I suppose, its liability to be counterfeited; and the last, its size being far too small.

To overcome both these objections, I propose the making of a coin, size of the half-sovereign in gold, but with the centre cut or stamped out, thus forming a section of a tube. This aperture must, of course, be of a size to reduce the coin to the value of five shillings.

I am, Sirs, yours respectfully,
JOSEPH E. CLARKE.
London, May 18, 1858.

INSIDE SCREW TOOLS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I shall feel obliged if some of your readers will inform me of the reason (if there be any) why inside screw tools are made contrary to all rule as to cutting edges for either iron or brass. Outside tools are in a very good position for cutting when held properly to the work, but inside ones are certainly quite the contrary.

It appears to me that inside tools ought to be cut on the *inside* of cylinders of steel, prepared for that purpose, as are the taps on which outside tools are cut; or, in other words, if it is right that outside tools should be cut up while held in the same position as that in which they are intended to be used, it is right that inside ones should be cut up in that position also.

If you think the subject worthy the consideration of your readers, some of whom will be better able to deal with it than I am, your insertion of this will oblige

Yours, &c., B. S.

WHITWORTH'S POLYGONAL RIFLE CANNON.—On Tuesday, the 11th inst., experiments were made at Shoeburyness with one of Whitworth's 32-pounder cast-iron polygonal bore rifle guns in the presence of the authorities. Gun 9 feet 6 inches long and 56 cwt. The first three rounds gave average results, but at the fourth round the gun burst into fragments.

SHEFFIELD GAS-HOLDER.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Two or three years ago I saw a newspaper paragraph stating that an immense gas-holder had been made for the Sheffield Gas Consumers' Company on a principle which allowed of much greater lightness than the old construction.

Can any of your correspondents mention what the new principle is, and whether it is applicable to the construction of ships?

I am, Gentlemen,
Respectfully yours,
J. J. M.
Belfast, May 15, 1858.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

DRAPER, S. *Improvements in the manufacture of handles and fastenings for doors of railway and other carriages.* Dated Aug. 14, 1857. (No. 2169.)

This cannot be described without engravings.

CLIFT, S. *Improvements in the purification of certain gases, and in the application of their products to the manufacture of alum.* Dated Aug. 15, 1857. (No. 2170.)

These consist in the application of sulphate of alumina, either in the crude or pure state, for purifying such gases as contain ammonia, and afterwards in the manufacture of alum from the products so obtained.

BOUSFIELD, G. T. *Improvements in the preparation of dough for bread, pastry, cake, and other farinaceous articles of food.* (A communication.) Dated Aug. 15, 1857. (No. 2174.)

The object here is that, in the process of preparing and baking, the dough will be raised or leavened, without chemical agents. The invention consists in mixing the dough in a close vessel under gaseous pressure. Also, in discharging the dough or paste so mixed from the vessel by the pressure of the gas, so that it can be taken directly to the oven.

BUCKLEY, J., and T. WRIGLEY. *Improvements in self-acting mules or machines for spinning and doubling.* Dated Aug. 15, 1857. (No. 2177.)

This refers to the winding-on motion of self-acting mules, where this is regulated by a radial arm, and relates to means for governing the rise of the nut in the radial arm to which the chain of the winding-on drum is attached, and also to self-acting means for regulating the position of the "nose-pin," which acts upon the chain of the winding-on drum.

PIROTTE, H. *Improvements in the construction of lathes for boring and turning.* Dated Aug. 15, 1857. (No. 2178.)

This relates to lathes for turning large and heavy articles, with a slow, steady motion. The patentee converts the platform carrying the articles to be turned or bored into a worm wheel by cutting teeth on its periphery, and communicates motion thereto by a worm or endless screw, with a differential pulley to vary the speed when desired. If a quicker motion be required, the driving worm may be thrown out of gear, and motion be communicated to the lathe shaft by a pulley on the outer extremity thereof.

SMITH, A. *Improvements in machinery for, and in the method or methods of, making wire ropes.* Dated Aug. 17, 1857. (No. 2179.)

These improvements, which consist in making right and left handed twisted strands or ropes at the same time, cannot be fully shown without engravings. The patentee claims, 1st. The use of a double set of reels for making right or left-hand strands or ropes in the same machine. 2. The laying up and stitching together simultaneously round ropes, so as to form flat ropes. 3. The unlaying, laying-up, and stitching together, simultaneously, round ropes already made, so as to form flat ropes.

ABRAHAM, J. *A new or improved gauge for gauging wire and sheet metal, and for other like purposes.* Dated Aug. 17, 1857. (No. 2180.)

This consists of a gauge in which the article to be measured is grasped between two jaws made to approach a separate by a differential screw, or a screw having threads of different pitches on different parts, the amount of rotation of the said screw and the thickness of the article being indicated.

TALBOT, R., and B. CROASDALE. *Improvements in looms.* Dated Aug. 17, 1857. (No. 2181.)

This consists of a simple arrangement for working the drop-box. The patentees employ a crank or lever at the end of the crank shaft, for giving motion to a beam or lever working in bearings in any suitable framing, and also a drum giving motion to a strap furnished with projections for forming a pattern; the said projections coming in contact with other projections upon a double elastic plate or spring, which is lifted up as required by the beam before mentioned, and allows the shuttle-box to fall, the reverse operation being caused by weights or springs.

CARMICHAEL, P. *Improvements in calendering and mangling cloth.* Dated Aug. 17, 1857. (No. 2182.)

The object is to do away with all weights, levers, wheels, and racks for giving the necessary pressure to the cloth. This is effected by placing on the top of each side of the framing an inverted cylinder or hydraulic ram, the pistons or rams of which are connected with the bushes of the upper roller, and having pipes connected with the said inverted cylinder or hydraulic ram supplied by a pump or head of water to give the pressure required.

HOE, R. *Improvements in bullion-boxes, and in boxes used for carrying other valuable commodities.* Dated Aug. 17, 1857. (No. 2183.)

This relates to the use of pieces of sheet iron in the form of crosses, rivetted to the sides and bottoms of boxes, in place of, or in addition to, the iron binding used for securing such packages.

NEWTON, W. E. *Improvements in the valve arrangement of steam and other engines.* (A communication.) Dated Aug. 17, 1857. (No. 2185.)

This has reference to that class of valve for reciprocating engines in which a main valve is made to open and close, so as to keep up a reciprocating action of the piston, &c. This is effected by the pressure of the propelling fluid being brought to bear on, and operate the main valve abruptly at, or shortly before, the close of the engine piston stroke, by means of a secondary or lap valve, which controls the admission and escape of the propelling fluid that operates the main valve, such controlling valve being driven by the engine. These valves should be arranged in a steam chest common to both, and one exhaust outlet made to serve for both, as has before been done.

MILLER, W. H., and H. E. SKINNER. *Improvements in rotary engines and pumps.* Dated Aug. 18, 1857. (No. 2190.)

This consists, 1st, in the combination of a piston working in a stationary circular steam way, or an ordinary ring, answering the purpose of an ordinary cylinder, with a slide or abuttal for the steam worked in a certain manner. 2d. In the construction of an eccentric disc working in a cylinder with a slide or abuttal placed against the periphery of the eccentric by means of steam acting upon a small piston in another small cylinder, the piston rod being connected to the slide or abuttal. And the invention, with reference to pumps, consists in admitting water instead of steam to the hollow ring, and discharging it therefrom by applying power to the shaft, and thereby causing the piston to travel within the hollow ring, and drive the water before it through the eduction passage.

NIGHTINGALE, C. *Improvements in, and*

applicable, to machines for tearing or reducing rags and other fabrics. Dated Aug. 18, 1857. (No. 2191.)

This consists in applying to such machines a wire gauze cylinder, in combination with a fan or exhauster, for withdrawing the light dust from the machine when in operation, and conveying and discharging it as required.

KEDDY, T. *New or improved machinery for the cultivation of land.* Dated Aug. 18, 1857. (No. 2194.)

This invention cannot be described without engravings.

BOTTOMLEY, S., J., and T. *Improvements in machinery acting upon, and in connection with, rotary shuttles boxes, for weaving checks, plaids, figured and fancy goods.* Dated Aug. 19, 1857. (No. 2196.)

This consists in adapting to looms certain mechanical arrangements for operating upon the rotary shuttle box, for presenting one or other of the shuttles therein, either in regular or irregular succession or order, to the action of the picker, according to the pattern.

WALL, A. *Improvements in amalgamating metals.* Dated Aug. 19, 1857. (No. 2197.)

This consists in the combination of metals possessing different electric characters for the purpose of sheathing ships, &c. It is intended to preserve metallic surfaces from corrosion, by sea water or otherwise, by placing in contact with them other metals, so as to render them less liable to be chemically acted upon. This is to be effected either by alloying the metals or by depositing one upon another.

WALL, A. *Improvements in coating metallic surfaces.* Dated, Aug. 19, 1857. (No. 2198.)

This consists in the preparation of materials for protecting the bottoms of iron ships, &c., from being corroded or coated in any way. One of these materials is prepared by mixing litharge with turpentine, colophony or resin, and wood naphtha.

BALESTRINI, P. A. *A new method of, and apparatus for, sounding at sea and in other waters.* Dated Aug. 19, 1857. (No. 2200.)

The patentee describes an apparatus in which, on the lead touching the bottom, an electric circuit is established, and a signal thereby given on board the ship.

POTTS, F. *Certain improvements in the mode of cutting out, forming, and finishing certain descriptions of metallic tubes, part of which is also applicable for other such like purposes.* Dated Aug. 19, 1857. (No. 2204.)

This consists, 1st, in a mode of cutting out strips of metal for the manufacture of taper and parallel tubes, and which arrangement is applicable to the cutting up of sheets of iron or metal where great exactness is required. 2d. In the manner of shaping taper tubes, whether such require to be soldered or otherwise. 3d. In the manner of forming parallel tubes before soldering. And lastly, in a mode of polishing metallic tubes, whether such tubes be taper or of other form or forms on their surface.

HARTLEY, W. *Improvements in steam engines and steam boiler apparatus.* Dated Aug. 19, 1857. (No. 2205.)

This consists, 1st, in a method of working the valves for the inlet of steam to the cylinder of the engine, so as to cut off that steam at any required part of the piston's stroke, the part cut off being regulated by the governor or otherwise. 2d. In regulating the supply of feed water to steam engine boilers. 3d. In a method by which a safety valve for steam engine boilers is made to open so as to discharge a volume of steam equal to the discharge of an unobstructed passage containing the same area as the passage through the valve seat.

GIST, R. C. *Improvements in the manufacture of manure.* (A communication.) Dated Aug. 19, 1857. (No. 2206.)

This consists in a method of generating, collecting, and fixing ammonia in fertilisers, and in compounding the materials in which ammonia, thus fixed and condensed, is a principal ingredient, with other substances so as to suit the nature of different plants, and thus stimulate and promote their growth and production.

BROOMAN, R. A. *A new method of defecating sugar and other saccharine matters, and of refining or rectifying alcohol.* (A communication.) Dated Aug. 20, 1857. (No. 2212.)

This consists in first treating saccharine matters with lime in excess and then with a saponaceous substance. The same method applies to the refining or rectifying of alcohols; that is, the refining is accomplished by employing an excess of lime, and then saponaceous substances.

INGRAM, T. *Improvements in railway breaks.* Dated Aug. 20, 1857. (No. 2217.)

This invention cannot be satisfactorily described without reference to the drawings.

GLOVER, J., and J. BOLD. *An improved material for transfer printing.* Dated Aug. 21, 1857. (No. 2219.)

This consists, 1. In the use of enamelled glass for transfer printing; and 2. In flushing the surface of white or tinted opal glass, or plain or coloured enamel, enamelled

metals, or other transparent or opaque mineral substances capable of receiving oil or ink impressions by the transfer process of printing, which the patentees propose to effect by operating upon the surface of the said materials with fluoric acid, or by grinding, which relieves it of its smoothness, thereby rendering the material sufficiently porous or permeable to receive and retain the oil or ink.

LAURENT, V. H. *A new improved machine for forging nails and other similar articles.* Dated Aug. 21, 1857. (No. 2221.)

This invention is intended to produce by machinery the same small objects as are obtained by hand forging, by presenting the red hot iron rod to the point of intersection of four sliding hammers, placed at right angles, and moving at a regular alternate motion, so that the rod to be forged is hammered on its four sides without an alternate rotating motion.

ASHCROFT, P. *Alarm signals for the prevention of accidents on railways.* Dated Aug. 21, 1857. (No. 2222.)

The patentee attaches a gong to the ordinary distance or auxiliary signal post, or other convenient place. This gong is struck by a hammer worked by the wheels of the engine and carriages passing over a treadle lever fixed by the side of the rail.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

SMITH, W. *Improvements in making soap.* Dated Aug. 15, 1857. (No. 2171.)

The inventor takes 1½ lbs. of common brown soap, and dissolves it in 1 gall. of boiling water. He then takes 120 ounces of sal soda, and dissolves it in 1 quart of boiling water. He then takes 6 ounces of quicklime, and slacks it in 1 gall. of cold water. He runs off the clear water from the lime, and mixes it with the sal soda water, and then adds the solution of soap first named. This compound is boiled, and, when cool, forms the improved soap.

CARDIN, J. J. *Improvements in brakes for omnibuses.* Dated Aug. 15, 1857. (No. 2172.)

This consists principally in the arrangement and combination of certain levers whereby a more speedy application and release of the break is said to be obtained.

AUCHER, A. J. *Improvements in elastic tissues for ladies' petticoats and other similar articles.* Dated Aug. 15, 1857. (No. 2173.)

These consist in introducing into the said tissues a suitable number of wires or strips of any suitable metal, such as fine steel wire, which may either form part of the warp or of the weft, or be introduced in the shed while the tissue is being woven.

CLARK, W. S. *Improvements in hay and hop presses, the same being applicable to compressing other substances of a similar nature.* (A communication.) Dated Aug. 15, 1857. (No. 2175.)

This consists in employing a box or frame having a door at its upper end, and fitted thereon is a follower attached to a bar, the ends of which pass through slots in the sides of the box, each end of the bar having a vertical strap fitted upon it. The upper straps are attached by pivots or joints to the lower ends of vertical bars, and worked by levers and a vibrating clamp.

HADDAN, J. C. *Improvements in the construction of railways, and of the carriages to be used therewith or thereon.* Dated Aug. 15, 1857. (No. 2176.)

This has reference to localities in which it becomes desirable to economise lateral space, and is practically applicable to the extension of traffic along the general line of existing streets, roads, or ways. The improvements consist in constructing such ways in two or more lines, one over the other; and also in constructing such combined ways with lifts or inclines for shifting the carriages from one line to the other, or forming a communication between the different levels. The improvements in carriages to be used upon such railways consist in forming them with the floor lying below, or nearly at the level of, the rails.

POZNANSKI, F. X. *An improvement in instruments for ascertaining and indicating the state of the pulse, which improvement is also applicable to other instruments in which fluids are required to circulate or work in tubes of small bore.* Dated Aug. 17, 1857. (No. 2184.)

This instrument consists of a tube 3 or 4 in. long, and of small bore, and provided at its lower extremity with an enlargement filled with mercury, and closed by a flexible diaphragm of thin leather. To prevent or overcome the capillary attraction which would interfere with the working of the mercury in the tube, a horse-hair or fine metal wire is introduced into the tube, and retained there. The tube is bent, and thereby facilitates the ascent of the mercury in it, which is divided into divisions, whereby the strength of the pulse will be seen, as the mercury at every pulsation is driven up the tube. The number of beats in a given time may be ascertained by a small sand glass adapted to the instrument.

GRIST, J. *Improvements in mash tuns, and in apparatus to be employed therewith, which apparatus is also applicable to*

the heating and keeping up of a continuous circulation of liquids in any vessel to which it may be connected. Dated Aug. 17, 1857. (No. 2186.)

These improvements comprise those described at p. 452, No. 1787, Vol. 67 (Invention No. 496), and some modifications of the same.

REEVES, C. *Improvements in the manufacture of knives.* Dated Aug. 17, 1857. (No. 2187.)

In making the blade, bolster, and tang, the inventor takes a piece of steel, rolls it in a heated state between rolls in which are grooves parallel to the axes of the rolls. The steel is thus flattened, except in the parts presented to the grooves, which are left of the original size. The strip of steel is cut into lengths, and by "cross rolling" the blade is further flattened. The bolster and tang are next, by an ordinary press and pressing tools, forced from the middle of the partially-formed knife to near the back thereof. By another press and cutting out dies the shapes of the blade and tang are perfected. The bolster is also perfected by dies and pressure. The blade is then ground and finished. The material for the handle is cut to its width by a circular saw, and the ends are shaped by circular cutters. The holes in the tang and handle are drilled simultaneously.

COUPE, J. *Improvements in power looms.* Dated Aug. 18, 1857. (No. 2188.)

The inventor employs a short strap connected with a spiral spring at each end of the lathe or slay. Through a hole in one end of the short strap the spindle of the shuttle box passes, and the other end of the strap is connected with the spiral spring, which is attached to the slay near the inner end of the shuttle box. In place of the short check strap it is proposed to place a short socket and washer of leather upon the inner end of the shuttle box spindle.

HUGHES, H. P. *Improvements in the construction or arrangement of a rock boring machine.* Dated Aug. 18, 1857. (No. 2189.)

This invention cannot be described without engravings.

LUPTON, B., R. JACKSON, D. DEAN, and J. HOLDEN. *Certain improvements in power looms for weaving.* Dated Aug. 18, 1857. (No. 2192.)

This relates to the "taking-up motion," and is designed for dispensing with the change wheels at present employed when a greater or less quantity of cloth is required to be taken up, and also for regulating the taking up according to the increasing diameter of the cloth beam.

YOUNG, W. *Improvements in fire-places or stoves.* Dated Aug. 18, 1857. (No. 2193.)

Here two circles of fire bars are used horizontally to form the bottom of a fire-place or stove, and are geared together. The coals are contained in a hopper at the back, the circles of fire-bars forming the bottom of such hopper, as well as of the fire-place. A space is left between such bars and the lower edge of the back, through which the fresh coal is brought at intervals by the revolution of the rotating circles of bars, and the coal, as it is so brought in, is prevented passing the cheeks of the fire-place or stove as such cheeks descend, so as to come nearly in contact with the fire-bars. By this construction the fresh coal will be brought in under the ignited coal, and will raise the latter in the basket or grate.

ROSENTHAL, S. *Printing on both sides of a sheet of paper by a single impression on an ordinary lithographic or other press.* Dated Aug. 19, 1857. (No. 2195.)

The inventor takes two zinc or other plates, and connects them together by hinges, facing each other as the covers of a book; each plate is to have on it the drawing or writing, and, when inked in the usual way, the paper is to be placed on one of the plates, and the other folded over it. They are then to be pressed in the usual way.

DESSALES, A. J. *An improvement in lamps for railway carriages, ships' cabins, and other oil lamps.* Dated Aug. 19, 1857. (No. 2199.)

This consists in constructing the oil box on the principle of a syphon filled from the upper part, in which a twofold action is produced. When the slide with which the upper part is provided is removed, for introducing the oil, the valve in the lower part closes, thus preventing the flow of oil in the supply pipe until the lamp is to be lighted, when, on closing the opening on the upper part with the slide, the valve in the lower part is acted upon, allowing the oil to flow freely through the supply pipe to the burner.

VASSEROT, C. F. *A smoke-consuming grate.* (A communication.) Dated Aug. 19, 1857. (No. 2202.)

This invention cannot be described without engravings.

LUND, E. *Improvements in cocks, valves, pumps, and water plugs.* Dated Aug. 19, 1857. (No. 2203.)

This consists in the employment of atmospheric air or vulcanised india-rubber to diminish the vibration or concussion which takes place in valves, pumps, &c., when fluid passing rapidly throug[illegible] them is suddenly stopped. The invento[illegible] p[illegible]

separate the air or gas from the water, &c., by a diaphragm of leather or a thin plate of metal, or to enclose the air or gas in a water-tight bag, so that the air or gas may not become mixed with the fluids.

RUFF, F., and M. GUTKIND. *Machinery or apparatus for folding and measuring fabrics and registering the same.* Dated Aug. 19, 1857. (No. 2207.)

This consists of a bed or table mounted horizontally upon standard frames, so as to secure the fabric on its surface, and cause the same to be folded by an alternating movement of folding or smoothing blades, whereby each fold of the fabric, as it is laid, is measured and registered by an index.

NAPIER, J. M. *Improvements in apparatus for paying-out submarine telegraph cables.* Dated Aug. 19, 1857. (No. 2208.)

The inventor provides an endless cable with holders at fixed distances to grip and sustain the cable near the ship, and relinquish their hold at the depth which may be deemed sufficient. To prevent the loss of the cable, he secures that the breaking shall be on board the ship, by passing the cable over a small pulley. The instant the strain is taken off this pulley by the breaking, a mechanical action takes place, which stimulates a powerful gripping apparatus placed in advance of the small pulley, and which is fixed to a buoy. The retiring cable tears away the buoy from the ship, and the buoy floats and sustains the ends of the cable. The break apparatus is regulated by the flow of water through a passage capable of being regulated in dimensions.

BROOKE, R. L. *Improved method of discharging, paying-out, and submerging electric telegraph cables, wires, or ropes, or such like articles, from ships or vessels of any description.* Dated Aug. 20, 1857. (No. 2209.)

This consists in placing a well or funnel, with rollers at the top and bottom, at or close abaft the midship section, or any other part below the water line of any vessel employed in laying cables, ropes, or wires, &c.

GOUGH, T., and J. MARGERISON. *Improvements in breaking apparatus for vehicles used on railways or on other roads or ways, parts of which are applicable for communication between guards and drivers of trains.* Dated Aug. 20, 1857. (No. 2210.)

Each carriage is to be fitted with a longitudinal sliding bar with buffer ends. These bars form continuous communication throughout the train. Working in connection with these sliding bars are transverse levers with elliptical heads, which turn on a pivot maintaining expansive action. These levers operate by an eccentric action on the ends of the rods connected with the break blocks, which, by the expansive action of the transverse levers, press on the wheels and prevent their rotation.

GEDGE, J. *Improved means of heating buildings and of facilitating the escape of smoke and gases therefrom.* (A communication.) Dated Aug. 20, 1857. (No. 2211.)

The inventor proposes to build a house, or group of houses, with only one shaft, all flues, air vents, &c., passing to this one central shaft.

SPILL, G. *Improvements in treating fabrics employed in the manufacture of hats, caps, and bonnets, and for other purposes, and also other fabrics, so as to render the same impervious to moisture and grease.* Dated Aug. 20, 1857. (No. 2213.)

These relate to the application of certain matters to the hats or bonnets, so that, whilst the same are impervious to grease or moisture, the surface may be uninjured by such application. The inventor dissolves india-rubber or gutta percha in a solvent, adding thereto powdered sulphur; and he spreads in a thin film the mixture thus obtained upon the fabric forming the coating of the hat or bonnet. He then subjects such fabrics to a high temperature.

TAYLERSON, R. *An improvement in metal ships and vessels.* Dated Aug. 20, 1857. (No. 2215.)

This consists in the employment of sheets of iron and ribs or frames of iron (in constructing a ship or vessel), which have been first coated with a metal or alloy as an intermediate coating, and then coated with copper, or any alloy of copper, so as to produce such a degree of oxidation or decomposition of the copper as to prevent a ship or vessel so constructed becoming foul.

PROVISIONAL PROTECTIONS.

Dated March 8, 1858.

466. Bindon Blood Stoney, of Dublin, civil engineer. Improvements in buoys, floating beacons, and other similar floating bodies.

Dated March 17, 1858.

542. William Stettinius Clark, of Upper Park-place, Dorset-square. Improvements in metallic canisters for holding gunpowder and articles of a similar nature. A communication from Messrs. Green, Wilson, and Green, of Delaware, U.S.

Dated March 24, 1858.

624. Albert Louis Thirion, pastor of Aische-en-Refail, Belgium. An improved method of transforming circular movements.

Dated April 15, 1858.

816. Frederick Samson Thomas, of Junction-street, Kentish-town, gentleman. An improved mode of propelling carriages upon railways.

Dated April 20, 1858.

863. William Stettinius Clark, of Upper Park-place, Dorset-square. An improved cultivator tooth, for agricultural purposes. A communication from P. Hannay, of Washington.

864. Ralph Peacock, of New Holland, Lincoln, engineer. Improvements in apparatus for preventing smoke in furnaces, and in effecting a more perfect combustion of fuel.

Dated April 22, 1858.

881. Thomas Hutchison, of Paisley, shawl-manufacturer. Improvements in shawls.

885. George Smith, of Morriston, near Swansea, manager of spelter works. Improvements in the manufacture of zinc. A communication.

887. Pierre Maugey, of Paris, optician. Improvements in diaphragms, for optical instruments. Partly a communication.

889. William Beck, of New York, manufacturer. Improved machinery for weaving fringes and other fabrics. A communication.

891. Timothy Harrington, of Dover, engineer. An improved method of ventilating the hold and other parts of ships.

893. James Stocks, of Berry-brow, York, plate-layer, and Charles Kaye, of Lockwood, same county, wagon builder. Improvements in apparatuses for coupling and uncoupling wagons and carriages on railways.

Dated April 23, 1858.

895. Thomas Greenshields, of Little Titchfield-street. Improvements in purifying gas produced from coal, and obtaining ammoniacal and other alkaline salts.

897. Charles Atkinson, of Sheffield, manufacturer. A certain improvement in venetian blinds.

898. Herman James Sillem, of Liverpool. Improvements in the machinery for the manufacture of sugar.

899. Joseph Poole Pirsson, of New York, civil engineer. Improvements in the condensers of steam-engines.

900. William Foster, of Black Dike Mills, near Bradford, York, spinner. Improvements in multitubular and other boilers for the prevention of smoke and economising fuel.

901. Alfred Jenkin, of Carrick Mines, Dublin, mining engineer. Improvements in furnaces for the reduction and calcination of lead, tin, and copper ores.

902. John Oliver York, of Paris, engineer. Improvements in obtaining power when bi-sulphuret of carbon is used. A communication from B. Hughes, of Rochester, New York.

903. Charles Lungley, of Deptford-green Dockyard, shipbuilder. Improvements in the construction of portable ships and boats, and their appurtenances.

Dated April 24, 1858.

905. Joseph Maitre, of Thiéffrain, France. Proper apparatus for washing iron mineral.

907. Rudolph Bodmer, of Thavies Inn, Holborn. An improved apparatus for removing sand and similar loose material from docks, rivers, and waterways. A communication from J. Johnson, of New York.

908. Frederick Lillywhite and John Wisden, of Coventry-street, cricketing outfitters. An improved apparatus for projecting cricket balls, or other similar articles.

909. William Alanson Clark, of Bethany, New Haven, United States. Improvements in expansive bits.

910. John Horton, of Ashburton, Devon, smith. An improved construction of horse-hoe.

911. John Lawson, of Leeds, machine maker. Improvements in machinery used in spinning flax and other fibrous substances. Partly a communication.

Dated April 26, 1858.

912. Leopold Newton, of Oldham, cotton spinner. Improvements in cop tubes used in spinning machinery.

913. Benjamin Burleigh and Frederic Ludwig Danchell, of Great George-street, Westminster. Improvements in filters.

914. John Martyn Fisher, of Taunton, Somerset, ironmonger. Improvements in chimney tops or cowls.

915. John Braidwood, of Glasgow, engineer. Improvements in steam boilers and furnaces.

916. Joseph Westerby, of Huddersfield, engineer. Improved apparatus for lubricating pistons.

917. Wright Jones, of Pendleton, iron founder. Improved machinery for ringing bells.

920. Joseph Seaman, of Bedford. Improvements in machinery or apparatus for effecting the working or cultivating of land, and in the means of driving the same.

921. William Foster, of Birmingham, cock founder. An improved vent-tap.

922. Edwin Evetts Lee, of Birmingham, die sinker. Certain improved modes of applying vitrifiable materials for the ornamentation of metal, buttons, clasps, and other articles of dress, and which said improvements are also applicable to the ornamenting of gilt-jewellery, book-clasps, and mounts, also parts of lamp-stands, chandeliers, and other such like articles made in dies, moulded, or formed in any other way.

923. Thomas Dobson, of Birmingham, engine smith. Improvements in machinery or apparatus for forging iron.

924. William Edward Newton, of Chancery-lane. Improvements in covering roofs and other parts of buildings with slate or other materials. A communication.

Dated April 27, 1858.

925. Edward Hunt and Henry Davis Pochin, of Salford, Lancaster, chemists. Improvements in the treatment and application of resins and resinous substances.

926. Edmund White, of Bath, outfitter. Improvements in facilitating reference by means of indexes.

927. Edward Simons, of Birmingham, manufacturer. Improvements in cornices and cornice poles for window and other curtains.

928. Charles Fréderic Vasserot, of Essex-street, Strand. Improvements in the arrangement and construction of blast-engines, pneumatic machines, and pumping engines generally. A communication from H. Thirion and Son, of Mirecourt Vosges, France.

929. John Fraser, of Gallowgate, Glasgow, chemist. Improvements in the manufacture of nitrate of potass.

931. George Randfield Tovell, of Mistley, Essex. Improvements in the construction of ships and other vessels.

933. Mary Moss, of Marlborough-place, Old Kent-road. Improvements in ladies' petticoats.

934. John Hulett, in the employment of Richard Hellaby, of Aldersgate-street, manufacturer. An improvement in shirt collars.

935. Maurice Sautter, of Paris. A new and useful improvement in diving bells. A communication from B. Maillefert, of Astoria, New York.

936. Wedderspoon Keiller, of Dundee and Perth, confectioner. Improvements in apparatus for cutting, reducing, or dividing vegetable, animal, and other substances.

937. William Edward Newton, of Chancery-lane. Improvements in machinery for splitting leather or skins. A communication.

939. Jean François Michel Charpentier, of Southampton-row, Russell-square, gentleman. A fire escape.

Dated April 28, 1858.

940. Marc Antoine François Mennons, of Paris. An improved apparatus for the condensation of smoke. A communication.

941. Marc Antoine François Mennons, of Paris. An improved saponaceous compound. A communication.

942. Marc Antoine François Mennons, of Paris. An improved process for combining silk with other textile substances. A communication.

943. Brooke Martin and Charles Julian Light, of Great George-street, Westminster, engineers. Improvements in railway turn-tables.

944. Edward Tomlinson, of Manchester, engineer. Improvements in cop tubes, and in the machinery or apparatus to manufacture the same.

945. Charles Fréderic Vasserot, of Essex-street, Strand. An improved waterproof fabric. A communication from J. J. de Frey, of Bordeaux.

946. William Clark, of Chancery-lane. Improvements in railway crossings. A communication from Emile Poiret.

947. Alfred Vincent Newton, of Chancery-lane. Certain improvements in the construction of paddle-wheels. A communication.

949. Alois Winkler, of Vienna, manufacturer. Improvements in printing or producing impressions in gold, silver, and oil colours upon metallic plates, and in the mechanism employed therein.

950. John Henry Johnson, of Lincoln's-inn-fields. Improvements in furnaces for the melting and reduction of steel, copper, zinc, and other metals. A communication from C. Andrè.

Dated April 29, 1858.

951. John Martin, of Barmer, near Fakenham, Norfolk, farmer. Improvements in machinery or apparatus for reducing, cutting, or pulping roots and other substances.

952. Stephen Bartlett, of Lupus-street, Pimlico. Improvements in machinery for forming gutta percha soles and uniting them to the upper leathers of boots or shoes. A communication.

953. Edward Simons, of Birmingham, manufacturer. Improvements in ordnance.

954. Angier March Perkins, of Francis-street, Gray's-inn-road. Improvements in high-pressure steam-engines.

955. Charles Lawrence, of Honley, near Huddersfield, engineer. Improvements in steam-engines.

956. Robert Johanny, engineer, of Vienna. Improvements in the construction of furnaces.

957. William Smith, of Salisbury-street, Adelphi. Improvements in spinning machinery. A communication from J. Hartog, of Rouen.

959. David Auld, of Glasgow, engineer. Improvements in working furnaces and steam boilers, and in apparatus connected therewith.

Dated April 30, 1858.

960. R. B. Huygens de Lowendal, of Chancery-lane. Improvements in the construction of springs, and for their new application to the working of machinery.

961. John Chadwick, of Manchester, silk-manufacturer, Arthur Elliott, of West Houghton, mechanic, and William Robertson, of Manchester, mechanician. Improvements in machines for twisting and winding silk direct from the cocoons, such machines being of the class commonly known as throstles.

962. Jozé Luis, of Welbeck-street, Cavendish-square. Proper apparatus for separating two substances of different densities; among others may be mentioned pit coal from the slate which it contains. A communication.

963. Benjamin Edouard Guyot de Brun, of Pantin, France. Leather tissue and other tissues rendered waterproof by a new process.

965. Edward Thomas Hughes, of Chancery-lane. An improved regulator and float combined applicable to the manufacture of paper. A communication from P. Denuelle, of Lyons.

966. Jules Cesar Faucon, of Paris, iron bedstead manufacturer. Improvements in bedsteads, bed-bottoms, seats, and articles for lying and reclining on.

967. James Chapman, jun., of Thanet, Kent. Producing a substance entitled felted-woody-fibre, convertible into useful articles, and applicable to the internal fittings and decorations of dwelling-houses.

968. George Henry Ellis, of New Malton, York, ironmonger. Improvements in cleaning boots and shoes by machinery, and in apparatus for the same, which is also applicable to cleaning other articles in domestic use.

969. William Clark, of Chancery-lane. Improvements in obtaining motive power, and in the apparatus connected therewith. A communication.

970. Peter Augustin Godefroy, of King's Mead Cottages, operative chemist. Improvements in the mode of separating vegetable from animal fibres or fabrics.

971. Charles Armand Joseph Demanet, of Brussels, Lieutenant-Colonel. The extraction of coals and minerals from mines.

972. John Henry Johnson, of Lincoln's-inn-fields. Improvements in suspension bridges. A communication from F. Schnirch, of Vienna.

973. Andrew Smith, of Mauchline, North Britain, manufacturer. Improvements in valves.

Dated May 1, 1858.

975. Robert Wardell, of Stanwick, near Darlington. Improvements in reaping machines.

976. Robert Illingworth, of Blackburn, engineer and draughtsman. Improvements in safety-valves.

977. William Spence, of Chancery-lane. Improvements in the production and application of a material called French purple, and in the process employed in obtaining it. A communication.

978. Leon Talabot, of Paris, merchant. Improvements in rolling railway and other bars.

979. William Hopkinson and John Dewhurst, of the Mayfield Printworks, Manchester, engineers. Improvements in apparatus for consuming smoke.

980. Frederick Michael Gregory, of Shavington, Shropshire. Improvements in chaff-cutting machines.

Dated May 3, 1858.

982. Charles Schleicher, of Bellevalé, near Aix-la-Chapelle. An improved machine intended to make the points of needles, pins, and all other similar articles.

984. Edward Spencer Trower, of Stansteadbury, near Ware, Hertford. Improvements in apparatus for treating flax, hemp, and other fibrous matters requiring like treatment.

986. John George Appold, of Wilson-street, Finsbury, gentleman. Improved apparatus for laying submarine telegraphic cables.

Dated May 4, 1858.

988. Joseph Smethurst, of Guide Bridge, Lancaster, engineer. Certain improvements in boilers for generating steam.

992. William Edward Newton, of Chancery-lane. Improved apparatus for mixing and moulding materials for the manufacture of fuel, parts of which apparatus are applicable to moulding bricks and other analogous articles. A communication.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," May* 18, 1858.)

12. F. Walton. Improvements in the manufacture of sheets or plates made of plastic compositions and other materials, and in the application thereof either alone or in combination with other substances to the manufacture of knife-handles, mouldings, artificial veneers, floor-cloths, and other ornamental and useful purposes.

17. J. Platt. Improvements in machinery or apparatus for spinning and doubling or twining cotton and other fibrous materials.

22. J. D Malcolm. Improvements in apparatus for ornamenting fabrics and other surfaces.

27. J. Reilly, jun. Improvements in chairs and seats of various descriptions.

28. E. Graham. An improved apparatus for threading needles.

34. P. Soames and J. C. Evans. Improvements in steam-cranes, parts of which improvements are applicable to the generation of steam.

40. T. Rowell. Improvements in furnaces.

44. T. Knowles and W. Ogilvie. Improvements in looms.

45. I. Taylor. Improvements in manufacturing metallic cylinders used in printing calico and other fabrics, and in imparting engravings to metallic cylinders used for such purposes.

58. J. B. A. Couder. Improvements in shawls.

61. J. A. Manning. Improvements in the treatment of sewerage and other polluted liquids.

66. J. Varley. Improvements in steam-engines.

71. R. J. Badge. Improvements in machinery or apparatus for drawing or extracting spikes or trenails from railway sleepers, and chairs and other similar purposes.

78. C. A. de Laire de la Brosse. Improvements in apparatus or machinery for the manufacture of looped or knitted fabrics. A communication.

83. E. Wilson. Improvements in pistons for steam engines driven by steam or any other elastic fluid, which improvements are also applicable to the pistons or plungers of pumps.

101. R. A. Brooman. Improvements in the preservation of animal and vegetable substances. A communication.

190. J. Shell. Improvements in the manufacture or preparation of paper for writing and copying purposes.

235. H. Ball. Improvements in repeating and other fire-arms, a portion of which improvements may be applied to ordnance.

238. J. Wells. Improvements in watch cases.

241. G. Pringle. Improvements in machinery or apparatus for propelling ships or vessels.

450. R. S. Bartleet. An improvement or improvements in papers, envelopes, or cases for holding needles.

537. P. Le Capelain. Improvements in dry gas-meters.

769. Hon. W. Talbot. Improvements in means or apparatus to facilitate the lowering and detaching of boats from ships or vessels, which improvements are also applicable to lowering and disengaging other bodies.

853. J. Howorth. Improved apparatus to facilitate the discharge of smoke and prevent its return, which said apparatus is also applicable for the ventilation of buildings.

861. J. Whiteley. An improvement in machinery for the manufacture of looped fabrics.

864. R. Peacock. Improvements in apparatus for preventing smoke in furnaces, and in effecting a more perfect combustion of fuel.

877. E. Green and E. Green, jun. Improvements in apparatuses for generating and superheating steam, and for heating.

885. G. Smith. Improvements in the manufacture of zinc. A communication.

897. C. Atkinson. A certain improvement in venetian blinds.

900. W. Foster. Improvements in multitubular and other boilers, for the prevention of smoke and economising fuel.

901. A. Jenkin. Improvements in furnaces for the reduction and calcination of lead, tin, and copper ores.

910. J. Horton. An improved construction of horse hoe.

929. J. Fraser. Improvements in the manufacture of nitrate of potass.

937. W. E. Newton. Improvements in machinery for splitting leather or skins. A communication.

959. D. Auld. Improvements in working furnaces and steam boilers, and in apparatus connected therewith.

972. J. H. Johnson. Improvements in suspension bridges. A communication.

977. W. Spence. Improvements in the production and application of a material called French purple, and in the process employed in obtaining it. A communication.

992. W. E. Newton. Improved apparatus for mixing and moulding materials for the manufacture of fuel, parts of which apparatus are applicable to moulding bricks and other analogous articles.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

1052. John Henry Johnson.
1065. James Steele.
1070. George Robinson.
1083. William Robertson.
1085. Robert M'Connell.
1087. James Buchanan.
1089. John Mason, Samuel Thornton, and Leonard Kaberry.
1091. Robert Stirling Newall.
1093. William Fawcett, John Lamb, and Francis Best Fawcett.
1115. Jean Guillaume Butt and Jean Alfred Martin.
1123. Edward Morewood and George Rogers.
1134. Thomas Piggott.

LIST OF SEALED PATENTS.

Sealed May 14th, 1858.

2864. George Printy Wheeler.
2866. John Macintosh.
2874. John Frederick Spencer.
2878. William Gossage.
2881. William Pidding.
2884. Richard Archibald Brooman.
2885. Richard Archibald Brooman.
2888. William Heward Bell.
2892. Andrew Frederick Germann, Frederick Gustavus Germann, and Joseph Germann.
2894. Robert Clegg.
2904. William Clay.
2950. William Blinkhorn.
2956. William Bowers Taylor.
2980. Jean Baptiste Couy.
3024. William Edward Newton.

3066. Charles Cowper.
3088. James Thornton.
3102. Henry Johnson.
3170. John Henry Johnson.
118. James Brown.
342. John Davis.
474. John Edgar Poynter.

Sealed May 18th, 1858.

2895. Major Booth and James Farmer.
2905. William Clay.
2915. Clement Lawrence West.
2918. Henry Walker, James Beaumont, & Joseph Gothard.
2920. Pierre Alphonse Brussaut.
2927. Jean Marie Auguste Eugène Fabart.
2843. Robert Willan, James Abbott, and Daniel Mills.
2959. William Elcock and Samuel Bentley.
3019. Thomas Sidebottom Adshead and Abraham Holden.
527. John Scott Russell.
561. Alexander Angus Croll.
583. John Biggs and William Biggs.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICE TO CORRESPONDENTS.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

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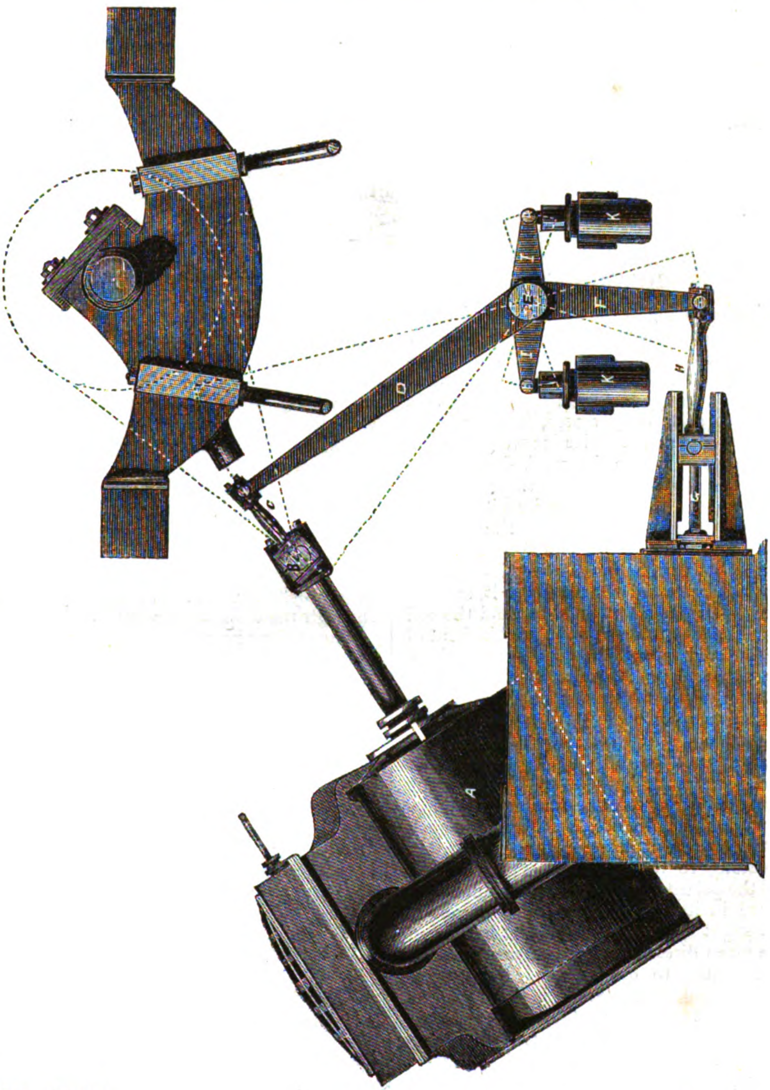
Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London, E.C.

MILLER'S PATENT IMPROVED MARINE ENGINE.



MILLER'S PATENT IMPROVED MARINE ENGINE.

Mr. Joseph Miller, the well-known engineer, of Millwall, has patented an improved arrangement of the parts of marine steam engines possessing several important advantages. An engine of the improved form is represented in the engraving on the preceding page, the parts not affected by the improvements being, for the most part, omitted. A, is the cylinder; B, the cross-head, to which are connected two links, C, of which one only is seen in the engraving. Two levers, D, are connected at their upper ends to the links, and at their lower ends they are keyed to a rocking shaft, E. F is another lever, keyed to the rocking shaft, and connected also to the head of the piston-rod, G, of the air-pump, by the connecting rod, H. I, I, are two levers also carried by the rocking shaft; these work the feed pumps, or the cold water, or bilge-pumps, K, as required. This arrangement of engine is very simple, and not heavier, if quite so heavy, as an oscillating cylinder engine. It is in its leading features like a locomotive engine, and so far, admits, if necessary, of being worked at a high velocity. The shaft, unlike an oscillating engine shaft, can be placed at any desired height from the bottom of the vessel. By the employment of this arrangement, the very expensive cranked intermediate shaft may be dispensed with—a part of the oscillating engine, as ordinarily constructed, liable to serious risk of accident; and the double-acting air-pumps, from their small size, are capable of being worked at a high velocity, and, from being placed at the lowest point possible, are extremely efficient. The invention will not require further recommendation to experienced engineers.

HEARDER'S PRINTING ELECTRIC TELEGRAPH.

The following is the description of an ingenious instrument invented by Mr. Hearder about twelve years since, for printing messages in pages with the Roman characters; and as there is, perhaps, none which surpasses it in efficiency and completeness, it deserves to be better known. Its movements are simple, and it can be worked either by a single or double wire circuit.

A light metal disc, moved on its axis by a step-by-step action, carries the Roman characters in relief on one face near the edge of its periphery. Two cylinders, one of which has a coil of paper upon it, and the other of which is intended to wind the coil from the first to itself, are placed in front of the lettered face of the disc, so as to draw the paper along in contact with it. The cylinder upon which the paper is coiled contains a spiral spring, upon the principle of a spring roller blind; the other cylinder is advanced step by step by means of a ratchet actuated by a lever. The moving power is a permanent magnet, mounted between the poles of a horse-shoe magnet, between which it moves either right or left, according to the direction of the current and the polarity of the horse-shoe, and maintained in its central position by means of two slight springs. The current being sent in a given direction, the permanent magnet is attracted to one pole of the electro-magnet, and, when passing in this direction, drives, by means of a ratchet attached to it, the disc containing the letters, which thus advances one letter at a time. These movements, being continued until the required letter is brought to a given point, the current is then reversed, and the permanent magnet, being attracted to the other pole, either actuates a hammer placed behind the paper, or closes a local circuit, which, by means of a second electro-magnet, causes the hammer to strike the paper opposite to the letter on the disc, which, by means of coloured transfer-paper, makes its impression on the sheet. As this hammer drops back into its place, a projecting stud on its prolonged axle moves the lever in connection with the step-by-step action of the empty cylinder, and winds the paper on through the distance of a letter.

The current now being transmitted in the first direction, the letter-disc is again advanced by degrees until the next required letter is brought to its position, when the reversion of the current causes it also to be imprinted on the sheet. The hammer, falling back again, advances the paper one step further, and leaves it ready to receive the print of the next letter, and so on, until the word is finished. When this is done, the letter disc is moved on until a blank space is brought into position, when the blow of the hammer is again made by reversing the current; but, there being no letter to produce an impression, a space is left after the word. This process is carried on until a line of a given length (say 3 to 6 inches) is produced, when a portion of the disc is brought into printing position, which contains a small lever, one end of which is struck by the hammer, and the other end of which lifts the driving ratchet of the wind-

ing cylinder out of gear, and allows the spring in the first cylinder to recoil and wind back the paper upon itself. Both cylinders are loose on slotted axes, and in their backward rotation advance by a movement similar to that by which the tunes of musical boxes are shifted, just so far along their axes as to shift the line which has just been printed out of the way, so as to allow a second line to be produced in the same manner. These cylinders may be made 8 or 10 inches in length, and with axes to correspond; by this means a page of from 3 to 6 inches in width and 8 to 10 inches in length can be printed in the Roman character. Instead of the winding cylinders, Mr. Hearder has also contrived a large light drum, whose circumference is the length of the intended page, and whose width corresponds with the width of the page. It is fixed loosely on a square axle, upon which it slides, in the direction of its length, in order to form the line—the drum being brought back again to its original position by a counter-balancing weight when the ratchet and spring are removed, whilst at the same time it is caused to revolve through a distance sufficient to advance each line out of the way of the next. By this apparatus messages may be transmitted in secret, for at the receiving station the instrument can be locked up, and the printed message can be taken out at any time by the person in charge of the office.

The apparatus thus described is suitable for a single wire circuit; but, where two wires are available, Mr. Hearder adopts a different mode. He uses the second wire exclusively for the hammer, and the reverse movement of the magnet produced in the first wire by changing the direction of the current, instead of actuating the hammer, now works a step-by-step movement of the disc in the opposite direction, and in this case the action is so contrived that each movement in one direction releases the ratchets and springs which act in the other, so that the letter disc will thus move backwards or forwards merely by reversing the current—a desideratum of the greatest importance, as will be seen by attempting to spell the word *solid*. By the single step-by-step movement, after the letter S has been indicated, it is necessary to bring up in succession each remaining letter of the alphabet, together with all the spaces or additional characters which the disc may contain, and then to recommence the alphabet, and advance letter by letter until the required one is brought into position, thus occupying at least twenty-six movements from S to O, whereas four movements would have sufficed by the retrograde action. This disadvantage increases in proportion as the letters are nearer to each other in their inverse order in the alphabet.

Mr. Hearder also describes an arrangement by which he prints without the use of the hammer before described, which is extremely simple. In this case the letters on the rotating disc are made of iron, and the paper is moistened with a solution, of which prussiate of potash forms an element, and, by means of a slight metal spring behind the paper, it is brought in contact with the iron type, and at the same moment the local circuit, instead of causing a hammer to strike it, simply flows through the type and paper, and thus produces a blue stain.

There are some details in the working of the telegraph for the purpose of ensuring accuracy which are interesting. For example, the current being sent and the disc moved, the magnets of all the relays can be retained in their position until the clerk at the receiving station breaks contact and releases the magnet as a signal that all is right.

Although several instruments have been invented, and even patented, possessing some of the contrivances here described, we know of none in which the combination is so complete and accomplishes so much. It has not been protected by patent, but, as Mr. Hearder has been in the habit of describing this apparatus in his lectures during the last twelve years, it may be a matter of doubt whether some of the patents which have been taken out in the meantime are at present altogether indisputable.

THE LAYING OF THE ATLANTIC CABLE.

The papers on Electric Telegraph cables, published at p. 222 of our No. 1804, for March 6, became the subject of one of the most protracted discussions that ever took place at the Institution of Civil Engineers, four evenings having been devoted to it. The official abstract of this discussion came duly into our hands; but, as much of it consisted of mere contradictory assertions, unauthenticated by the names of the speakers, we refrained from occupying our space with it. One of the most prominent speakers was Professor Airy, the Astronomer Royal, who, after the conclusion of the discussion, submitted to the Council, on the evening of April 27th, certain further observations explanatory of his former remarks. These observations he has thought proper to embody in a paper, and send for publication to the *Nautical Magazine*. To

this paper Messrs. Longridge and Brooks, the authors of the paper which originated the discussion, have replied in the following letter addressed to ourselves. In order that the subject may be placed completely before our readers, we will first give Professor Airy's paper in the form in which he submitted it to our contemporary, and then follow it by the letter of Messrs. Longridge and Brooks.

THE ATLANTIC CABLE PROBLEM.—BY PROFESSOR AIRY.

The last year's history, and the present year's anticipations, of the attempt to deposit the Atlantic Submarine Telegraph Cable, have given to the mathematical problem of the deposit of a submarine cable a very great interest. The problem is by no means a simple one. To investigate the form assumed by the descending cable and the tension at every point, it is necessary to consider the motion of the ship and the continual change of position which it gives to every particle of the cable: this, however, as appears on entering into the investigation, can be done without much difficulty. A far more important modifying circumstance is the resistance presented by the water to the descent of the cable, especially when the cable is so slender in its dimensions and so light in its material as the Atlantic cable. I have, however, with some trouble, completely mastered the influence of this cause also, and am able to exhibit my deductions in a shape which, I trust, may be practically useful.

I will not weary your readers, on this occasion, with a parade of algebraical symbols. In order to present the results in the clearest form, I have prepared a table on the supposition that the ship's velocity is double the terminal velocity of the cable when allowed to fall freely in the water (a proportion which, I believe, does not differ materially from that in the actual case). As the investigation is perfectly general, there would be no difficulty beyond the mere trouble of calculation in preparing a table for any other proportion of the velocities: but the table now offered, I believe, will be found sufficient for conveying the ideas which I desire to impress on the readers of the *Nautical Magazine*. It will be seen from my subsequent remarks of general character, that the preparation of such a table necessarily implies that the cable is delivered with the same speed with which the ship passes through the water. The circumstances of a cable which is delivered with a speed greater than that of the ship will be explained afterwards. The unit of measure is in all cases the depth of the sea. The unit of tension is in all cases the weight of a piece of cable whose length is equal to the depth of the sea, as weighed in sea water. So that if (for example) the tension is expressed as 2·5, and the sea is 2 miles deep, this means that the tension is the weight of 5 miles of the cable as weighed in water.

Angle made by the Cable with the Horizon at leaving the Ship.	Tension at the Point of leaving the Ship.	Length of suspended Cable.	Corresponding horizontal Extent.	Difference of stray Length necessary for the slope of the suspended Cable.
2° 52'	747·23	39·326	39·311	0·015
5 43	173·62	19·303	19·267	0·036
8 34	71·33	12·616	12·564	0·052
11 22	36·78	9·254	9·184	0·070
14 9	21·36	7·222	7·134	0·088
16 53	13·26	5·849	5·742	0·107
19 32	8·50	4·843	4·716	0·127
22 6	5·46	4·055	3·905	0·150
24 30	3·32	3·376	3·200	0·176
25 37	2·39	3·031	2·839	0·192
26 34	0·53	2·236	2·000	0·236
{Limiting Angle.}				

A cursory inspection of this table will show, not only the amount of tension in special circumstances, but also the increase of tension or amount of danger which may be introduced by mismanagement of the delivering apparatus. Thus suppose that the delivery has been effected with a stray length of 0·236 and with a tension of only 0·53, if by inattention to the mechanism the delivery is impeded for a time, so that the stray length is diminished by 0·166, the the stray length will be reduced to 0·070, implying that the tension is increased from 0·53 to 36·78. The only indication of this which will be presented to the superintendent is, that the angle of inclination of the cable has been reduced from 26° 34' to 11° 22'.

It is evident from this that a vigilant watch on the angle of inclination of the cable is of the utmost importance for its safety. And no one of the mechanical arrangements appears to require greater attention than one which shall faithfully exhibit to the eye of the superintendent at every instant the slope of the cable as it leaves the ship.

I shall now make a few general statements on the characteristics of the curve formed by the cable.

I.—*General Remark.*

A. In no case whatever is the convexity of the curve upwards.

II.—*The speed of delivery being supposed equal to the ship's speed.*

B. Divide the terminal velocity of the cable when falling freely in water by the ship's velocity, and find the angle of which this quotient is the trigonometrical tangent. This is the critical or limiting angle.

C. The lower part of the curve approaches in form to the common catenary: but the inclination of the upper part to the horizon never exceeds the limiting angle. If the tension be great, the curve is nearly the lower part of a catenary of large dimensions. If the tension at the bottom be small, the greater part of the curve will be nearly a straight line, lying at the limiting angle.

D. If the tension at the bottom be absolutely nothing, the form of the cable will be absolutely a straight line, lying at the limiting angle. There will be, however, a small tension at the point where the cable quits the ship (see the last line of the Table): the tension diminishes gradually from the ship to the bottom.

III.—*The speed of delivery being supposed greater than the ship's speed.*

E. If the speed of delivery be augmented, the tension is diminished, until the proportion of the speed of delivery to the ship's speed becomes the same as the proportion of radius to the cosine of the limiting angle. When this proportion holds, there is no sensible tension in any part of the cable: but it maintains a straight form, although inclined at the limiting angle, from the ship to the bottom, where it will probably be deposited in something of a serpentine or involved form. Supposing (as in the Table) the ship's speed to be double of the terminal speed of the cable falling freely in water, the proportion just mentioned is the proportion of 1·1118 : 1, or the loss of cable is $11\frac{1}{5}$ per cent.

F. If the speed of delivery be augmented beyond this, the cable will not maintain its straight form in an inclined line, but will descend in a serpentine or involved form, preserving on the whole the direction of the limiting angle.

IV.—*Practical Inferences.*

G. If the cable be exceedingly weak, or the sea excessively deep, it may be good policy to ease the strain upon the cable by delivering it with a speed rather greater than the ship's speed, but not exceeding that defined by the proportion in article E. In this way the cable may be safely laid in a sea of any depth whatever, as long as the ship is maintained in a state of motion.

H. If the cable be not exceedingly weak and the sea not extremely deep, the cable should not be delivered more rapidly than the ship goes (except occasionally when it is found that too much strain has been put upon it). The angle of inclination should be less than the limiting angle by the smallest quantity possible. The most vigilant care should be given to prevent any sensible diminution of this angle.

V.—*Caution in regard to stopping the ship.*

I. If the ship's motion is stopped, and the delivery of the cable at the same time stopped, the tension of the cable is immediately much increased. If the stoppage of the ship occurs in deep water, the cable ought as soon as possible to be delivered out liberally, or the ship ought to be backed, till the cable assumes a position not much inclined to the vertical. No length of cable will be lost by this, as, upon the ship's again advancing, without paying out cable for a short time, the depending cable will quickly be taken up into a position similar to its former position, and without any iregularity at the bottom. The minimum tension, when the ship is stationary, is 1·00.

I will now indicate the only element affecting my theory upon which there may be uncertainty to such an extent as to affect in one case the practical conclusions.

The cable generally is subject to the lateral resistance arising from a lateral motion through the water, and also to the friction arising from an endwise sliding through the water: the latter movement being in most cases extremely small. As I have no sufficient data in regard to the amount of this friction for a given speed, I have supposed it the same as the lateral resistance for the same speed. No sensible error will be introduced by the uncertainty on this point, except in the case contemplated in article E.

Now I think it very likely that it may be necessary, in regard to the Atlantic Cable only, to deliver cable with greater speed than the ship's speed, as contemplated in article E. The strength of the cable appears to be able to carry about $4\frac{1}{2}$ miles of its length in water; or, taking the depth of the sea at $2\frac{1}{4}$ miles, it will be about 2·00 if expressed on the same scale as the numbers of my table. On referring to my table it will be seen that the corresponding angle

for this tension approaches so near to the limiting angle, that it will not be safe to trust to delivery at the limiting angle with a velocity equal to the ship's velocity, but that a greater velocity of delivery must be used, to lighten the tension. But the per centage of excess of delivery (and consequently the per centage of excess of cable to be provided) will depend on the coefficient expressing the friction for endwise motion of the cable; on which, as I have said, there is great uncertainty. It appears to me not unlikely that the practical success of the undertaking, in the present season, may depend on this element, hitherto overlooked.

G. B. AIRY.

Royal Observatory, Greenwich,
April 23, 1858.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—The *Nautical Magazine* for this month (May) contains a paper by the Astronomer Royal on Submerging Telegraphic Cables.

This paper seems to be nearly the same as one which was read on the 27th April, before the Institution of Civil Engineers, in explanation of some observations made by the learned Professor in opening the discussion upon the paper which we had submitted to the Institution on the same subject, and which was read at their Meeting of 16th February.

The discussion having been finally closed before the learned Professor's paper was read, and it being received by the Council as an explanatory statement only, we were precluded on that occasion by the rules of the Institution from doing more than making a few general remarks in reply; but as the subject is one of great interest and importance we trust you will allow us space for a few observations in your columns.

We quite agree with Mr. Airy, that the problem can only be satisfactorily dealt with mathematically, and that it is one of considerable difficulty when all the forces are taken into account. Having adopted this method and solved the various problems, we were much surprised to find the conclusions of the learned Professor at variance with our own, and were at some loss to account for the difference of the results.

Without troubling you at present with any formula we beg to submit the following observations on the paper under review.

The following table* is given by Mr. Airy, showing—

1. The angle of the cable at the ship; 2. The tension on ditto; 3. The length of suspended cable; 4. Corresponding horizontal length; 5. Difference or stray length.

This table is prepared on the following hypothesis:—1st. That the ship's velocity is double the terminal velocity which the cable would acquire falling freely (and, we presume, horizontally) in water. 2d. That the cable is delivered with the same speed with which the ship passes through the water. 3rd. The unit of length is the depth of the water in which the cable is being laid. 4th. The unit of tension is the weight in water of a piece of cable equal to the depth of the sea.

Now, in the case in question the velocity of the ship is taken at six feet per second, and the terminal velocity at three feet per second, and from this is deduced what is called the "limiting angle," which is stated to be the angle whose tangent

$$= \frac{\text{terminal velocity}}{\text{velocity of ship}} = \frac{3}{6}, \text{ or an angle of}$$

26° 34′.

This agrees very nearly with the angle found by our formula, and is, in fact, the angle at which the cable would leave the ship under the above circumstances, *provided it were laid without tension at the bottom*. In this case it would descend from the ship to the bottom in a straight line, and this agrees with the learned Professor's deduction D.

This being so, how, we ask, is it possible for the angle to be reduced from 26° 34′ to 2° 52′, as represented in the first line of the table? Clearly only by an alteration in the relative speed of the cable and the ship; but this is contrary to the second hypothesis, upon which the table is based, for, as we have before observed, the Professor states, "that the preparation of such a table necessarily implies that the cable is delivered with the same speed with which the ship passes through the water."

It appears to us that the table does not represent the relations between the inclinations and tensions during the laying of a cable without tension at the bottom and without slack, which is the real problem to be solved in a general form; but that starting with an angle, which is called the "limiting angle," and which, in fact, is the angle at which alone the operation can be conducted consistent with the abovenamed conditions, it then traces the effect of retarding the paying-out so as to reduce the quantity of cable paid out below the distance moved by the ship.

Under such circumstances the cable must rise at the bottom and assume a form

* See *ante*, p. 503.

approaching to the catenarian curve, and it seems to us that the consequent variations of inclination and tension are what are exhibited in the table in question.

But it is at once evident that if the exit of the cable be reduced below the speed of the ship the result must be to break the cable.

With respect to the tensions we cannot agree with the tabulated statement.

According to our calculations we find that so long as the cable is laid without slack, and without tension at the bottom, the tension at the ship is nearly independent of the angle of the cable, and is equal to the unit of tension as above defined, less a certain amount due to the longitudinal friction of the water on the cable.

The amount, however, in the case in question is very small, and certainly could not reduce the tension from 1 to 0·53.

The author admits that the effect of this is very small, but he states that he has supposed it to be the same as the lateral resistance for the same speed. If by this it be meant that the longitudinal friction per foot length is equal in force to the lateral resistance per foot length, we must demur to such a conclusion. From Colonel Beaufoy's experiments, which we have followed as the best bearing upon the subject, we find that in the case of the Atlantic cable the longitudinal friction would not exceed one-sixtieth part of the lateral resistance, and we are, therefore, disposed to think that the small amount of tension shown in the tables as corresponding to the angles 26° 34′, viz., 0.53, is due in part, at any rate, to this over-estimate of the longitudinal friction.

We are quite convinced that there is some great error in this part of the learned Professor's calculation, because, according to it, the tension of the Atlantic cable in 2,000 fathoms of water would not exceed 19 cwt., which we know is at variance with the results of experience. Again, when treating of the effect of increasing the speed of delivery, the author states that when the ship's speed is twice the terminal velocity, there will be no sensible tension at the ship if the velocity of the cable be 11¾ per cent. above that of the ship.

Now, we have abundant experience to show, that even when the velocity of the Atlantic cable exceeded that of the ship in a proportion greatly beyond 11¾ per cent., the tension at the ship was very little relieved; and this agrees with the conclusions derived from our own formula, where we have shown that the relief to tension from longitudinal friction is, under the ordinary circumstances of laying cables, very insignificant.

The exact value of the coefficient of longitudinal friction is an important desideratum, and it could be easily ascertained during the experimental trip of the vessels about to be engaged in the second attempt to lay the cable.

We think that the learned author has greatly over-estimated the value of observations on the angle of the cable as indications of the tension. In a uniform depth of water and with an unvarying speed of the ship, there is, doubtless, a fixed relation between the angle and the tension, but the angle varies with the speed of the ship, whilst the strain does not; and thus it may be perfectly safe to pay out a cable at an angle much less than 2° 52′, provided it could be got safely up from the coil.

But there is also a practical difficulty in valuing the angle, and, owing to causes which we fully pointed out during the discussion at the Institute of Civil Engineers, the cable does not descend from the ship to the surface of the water at the angle given by theory, which is the correct angle for the cable below the water. In fact, there is a double curve from the ship. At first, the cable descends in a catenarian form through the air, so that at the surface of the water the angle is less than at the ship; and then, again, there is a curve convex upwards joining the catenary with the straight line below the surface; and both these causes tend to make the angle at the surface of the water less than that given by theory; and when we add to this the difficulty of observing such an angle when the ship is pitching in a sea way, we cannot think its observation to be a trustworthy guide with respect to tension.

During the discussion at the Institute of Civil Engineers, it was stated that the angle of the Atlantic cable in deep water had varied from 11° to 22°. Those angles, according to the table above referred to, correspond to tensions of 6 tons and 10 tons respectively; and yet the breaking weight of the cable was not more than 4½ tons.

We think, therefore, that we have sufficiently shown that the angle cannot be depended upon as an indicator of the tension; and this conclusion, based on experimental knowledge, entirely agrees with our own theoretical results.

The last column in the table is, we think, unfortunately designated, and would lead to the belief that it was requisite to pay out the cable with a certain waste or extra length beyond the distance moved by the ship. This opinion—which, from the published accounts, appears to have been held by those who took part in the discussion at

the Meeting at the British Association in Dublin—is entirely erroneous, and it is contrary to the second hypothesis upon which the table is constructed; but yet another paragraph seems to imply that the same idea was lurking in the mind of the author when he speaks of the delivery being effected with a "stray length" of 0·236; and again, of the stray length being diminished by 0·166 and reduced to 0·070.

We now turn to the general remarks, and shall, for the sake of brevity, refer to them by their initial letters.

A, C, and D are in accordance with the results of our own investigations.

E, we have already shown to be at variance with experience, as it is also with our own calculations.

F. If E were true, the speed of delivery could only be augmented by pushing the cable out of the ship; but even in this case there is theoretically no force in action to cause it to assume a serpentine form in its descent.

G. The amount of tension would be very slightly decreased by delivering the cable "with a speed rather greater than the ship's speed," and we must differ entirely from the conclusion that "in this way the cable may be safely laid in a sea of any depth whatever, as long as the ship is maintained in a state of motion." The tension is nearly independent of the angle, is very little relieved by an excess of cable, and increases very nearly as the depth of water increases.

H. As before stated, we cannot admit that observations of the angle of inclination are trustworthy indications of tension.

I. This agrees with our own calculations, in which we have given tables showing under various circumstances the lengths of cable necessary to be paid out in order that the cable may assume the vertical position.

In his concluding paragraph, the Astronomer Royal attaches great importance to the relief to be derived from an excess of delivery of cable, and goes so far as to say that "it appears" to him "not unlikely that the practical success of the undertaking in the present season may depend on this element (the longitudinal friction), hitherto overlooked." This element we had not overlooked, but, on the contrary, had introduced it into our equations, and had estimated its value from Colonel Beaufoy's experiments; and, having done so, we are compelled to come to a very different conclusion from that above expressed.

We trust that, during the experimental trip, the precise value of this element will be determined, as it will be very easily done. But we feel convinced, both from theoretical investigations and from practical results, that it will be found not to exercise such an influence as to warrant us to look to it for relief against the great tension arising from a cable of great specific gravity.

We have the honour to be, Gentlemen,

Your obedient servants,

J. A. Longridge.

C. H. Brooks.

A Treatise on Electricity, in Theory and Practice. By Aug. de la Rive, Ex-Professor in the Academy of Geneva, &c., &c.; translated for the Author by Charles V. Walker, F.R.S. Three Vols. 8vo. Longman and Co. 1853—1858.

The name of De la Rive has long been amongst the foremost in the annals of electricity, and is, therefore, too well known to most of our readers to render it necessary to say much by way of introduction. Both as an experimenter and a theorist the author of this treatise stands amongst the very highest in Europe. Any work, therefore, from his pen must be valuable, but the one before us is unusually so, because it contains not only the matured result of his own extensive researches, but also of all other electricians up to the present year. No work at all approaching it in either fulness, completeness, or clearness, has yet been published. The three vols. contain very nearly 2,300 pages, and have been more than five years in the course of publication, the delay having been in a large degree occasioned by the anxiety of the author to make his work as complete as possible. We have in it, consequently, not merely a full exposition of the older laws and applications of the science, but of its most recent acquisitions and developments, all set forth with that perspicuity and accuracy which no man could give who was not a thorough master of the science. We shall proceed to describe briefly the principal contents of the work. It is divided into seven parts, the first of which is "preliminary," and contains a very clear exposition of the elements and general view of the science. The second treats of "Static Electricity," in five chapters—on "Electrical Attractions and Repulsions," "Distribution of Electricity on the surface of Insulated Conducting Bodies," "Electricity by Induction," "Condensers and Leyden Jars," and "The Theory of Static Electricity, and divers facts connected with it." Part III. is on "Magnetism and

Electro-dynamics," and is divided into six chapters and an appendix, the subjects being, "On the Magnet and Magnetic Phenomena," "Mutual Action of Magnetism and Dynamic Electricity and of Electric Currents upon each other," "Magnetisation by Dynamic Electricity," "Galvanometer Multipliers," "Electro-dynamic Induction," "Action of Magnetism upon all bodies—Diamagnetism," with various additions in the appendix, bringing down the subjects treated of to the moment of publication. At the end of the first vol. are "Notes relative to Mathematical Developments of certain particular points." Part IV. is on "The Transmission of Electricity," in four chapters, which treat of "The Propagation of Electricity" in general; "Calorific and Luminous Effects of Dynamic Electricity;" "Chemical Effects of Dynamic Electricity;" and "Physiological Effects of Dynamic Electricity." Part V. is on the "Sources of Electricity," and contains three chapters—the first, on "Electricity produced by the action of Heat;" the second, on "Electricity produced by Mechanical Actions;" and the third, on "Electricity produced by Chemical Actions." This last chapter contains the author's own theoretical views on this much-debated subject. The second volume, like the first, has Notes at the end relative to the mathematical parts of the subjects treated of in it. Part VI., which commences the third volume, is on "The Relations of Electricity with Natural Phenomena," in three chapters—chapter 1, on "The Production of Electricity in Physiological Actions;" chapter 2, on "Atmospheric Electricity;" and chapter 3, on "Terrestrial Magnetism." Part VII. is occupied with the "Applications of Electricity," in three chapters: the first chapter, on "Physical Applications," treats of "Telegraphs," "Electric Clocks, "Electric Weaving," "Electric Registers," &c. The second chapter is on "Chemical Applications," such as Electrotype or Gilding, Silvering, &c. Chapter 3 is on "Physiological or Therapeutic Applications." The third volume has an Appendix and Notes similar to volumes 1 and 2.

We have thus given a general outline of the work, from which the reader may readily infer its comprehensive nature. Very copious references are added at the end of each chapter to the various books, magazines, translations, &c., where the sources of information are to be found, thus serving as a general index to almost everything that has been written (especially on the Continent) on the science.

To review in any detail a work of such extent is, of course, incompatible with the other claims on our pages. We must, therefore, confine ourselves to a few remarks. We shall regret this the less because it is obvious that all students of electrical science will consider the possession of the work itself as indispensable—at least, all who can afford it (and we may take this opportunity of saying that those who can read the French original will save a very considerable sum by procuring it instead of the English version).

We have already said that the first part contains a very clear and scientific outline of the elements and general nature of the science. The author has adoped the *nomenclature* of the "Two-fluid" theory, but he evidently does so (as he declares himself) as a mere matter of convenience, without attaching any weight to the theory itself. He inclines rather to the "Vibratory" theory, which accounts for the phenomena of electricity in a similar way to that in which the Undulatory or Vibratory theory of optics explains the phenomena of light. After describing the two theories which until recently were the most prevalent, viz., the "One-fluid" and the "Two-fluid" theories, he says:—

"We shall not here discuss the comparative merits of these two theories; the latter, at least in such sort as Franklin has formularised it, cannot be admitted. We shall presently see for what reason. The former, although subject to strong objections, is, however, for the present state of the science, a very convenient and tolerably exact manner of representing to ourselves this agent that we term *electricity*. It is under this point of view that we shall adopt it. However, we may for the present say that it is very probable that electricity, instead of consisting of one or two special fluids *sui generis*, is nothing more than the result of a particular modification in the state of bodies. This modification probably depends on the mutual action exercised on each other by the ponderable particles of matter and the subtle fluid that surrounds them on every side—a fluid that is generally designated by the name of ether, and the undulations of which constitute light and heat."—(Vol. i., pp. 17, 18.)

In denoting the elementary principles of the "Voltaic Pile" (p. 49—52), the author has caused some obscurity to readers who are not already acquainted with the subject, by neglecting to define what he means by a "*pair*," until *after* his account of the subject in which that term is frequently used. The definition at the top of page 52, that "what we call *the pair* is not the association of the two metals plunged into the same cell, but is formed of the two metals in

metallic contact," ought to have preceded the account of the pile given in pages 49 and 50. Of course, a reader who is already familiar with the subject, will see what the author means by "a pair:" but elementary chapters of this sort are *not* written for such readers. In general, however, the author is very perspicuous—though, we are sorry to say, the translator has often done his best to destroy his perspicuity by the preposterous *punctuation* by which the whole of the translation is disfigured. There are a few passages, however, in which the author himself is vague and indefinite, and, even, apparently contradictory, owing to the employment of phraseology which, being derived from theoretical notions of a very unsatisfactory nature, must, of necessity, lead to ambiguity, and even contradiction. The theory of "two fluids" may be, as the author says, convenient in some respects, but it has *inconveniences* so great and numerous as, in our opinion, to counterbalance and even preponderate over the conveniences. Thus, at page 87, of vol. i., we read:—

"It is not therefore, as has often been erroneously said, the positive electricity of the 'glass plate that has passed into the conductor: it is the negative of the conductor that has passed out by the points, and has left there the positive, with which it formed the neutral fluid, and from which it has been separated by the influence of the plate.' This occurs in a description of the theory of the 'Effects of Points in the Phenomena of Induction and in the Electrical Machine;' but at page 109, where the author comes to describe 'the Leyden Jar and its Theory,' we have, what looks very like the same theoretical explanation which he has condemned as unsound in the passage just quoted. 'In order to charge the jar, it is held in the hand by the outer coating, and the knob is presented to the conductor of the Electrical Machine. *The positive electricity of the machine penetrates to the inner coating*, decomposes through the glass the natural electricity of the outer coating, &c."

Such a vague and totally unproved theory as that of the Two Electrical Fluids must always be injurious, and lead even the most cautious and well-informed men to incorrect and indefinite language—if not incorrect and indefinite views of the facts themselves—to which it is applied.

At page 300, a very interesting section is commenced on "Vibratory Movements and Molecular Effects determined in Magnetic Bodies by the Influence of Electric Currents," in which the reader will find some good experiments by the author himself in addition to those of Wertheim, Beatson, Joule, &c.

In the Part relating to Electro-Dynamics, the author does full justice to the merits of Ampère, whom he rightly entitles the "Newton of Electricity." In the Appendix to the 5th and 6th chapters (with which the second vol. commences) an account is given of the very careful experiments of Weber, by which Ampère's theory was verified and completed.

The second and third volumes are full of most valuable matter, both experimental and theoretical, on many points of which we are strongly tempted to dwell; but, even if we could afford the same space which we gave in a former volume of this Magazine to the review of the last volume of Faraday's "Experimental Researches," this would be insufficient for a work of so much larger dimensions, and embracing so much greater a variety of topics. We shall, therefore, make only one extract as a specimen of the varied and interesting information with which the work abounds. It is from the chapter on "Atmospheric Electricity."

"Besides the general influences that we have just been pointing out, we must not overlook that there exist local circumstances which influence the frequency of storms. Thus, as we have already remarked, it never thunders in Lower Peru, which, nevertheless, corresponds by its geographical position with the regions where it thunders most. On the other hand, in Jamaica, from the first day of November to the middle of April, the summits of the mountains of Port Royal commence to become covered with clouds between eleven o'clock and noon; at one o'clock these clouds have acquired their maximum density, the rain escapes from them by torrents, lightnings dart from them in all directions, and, finally, the thunder causes its rollings to be heard as far as Kingston; about half-past two the sky has recovered all its serenity: this phenomenon is reproduced every day for five consecutive months. Thus, Kingston reckons 150 days of thunder per annum, whilst there are not more than 50 at most in the neighbouring islands and in the points of the continent similarly placed; whence it follows, that the influence of the mountains of Port Royal upon the production of storms seems manifest. The equinoctial regions furnish some other analogous examples. There exist some also in the temperate regions. Mr. Dillwyn thinks he has remarked that in mining countries there are less storms than in other countries, and notably than in calcareous

countries. M. Blavier, an engineer of mines in France, says, that it is recognised in the department of Mayenne, near Niort in particular, that the existence of certain masses of granulous or compact diorite (*grunstein*), which contain much iron, repels, or dissipates, the most threatening storms, a property that M. Blavier attributes to the conducting action of these masses of diorite. On the other hand, M. Vicat has had the opportunity of remarking at Grondone, on the chain of the Apennines, between Genoa and Plaisance, the influence upon the formation of storms of a rich mine of iron, that seems to pierce the ground under the form of a peak. It is rare that a single hot day of July or August passes without an electric cloud forming above the territory of Grondone; this cloud insensibly increases, remains during some hours, as it were, suspended over the iron mine, then bursts forth, discharging itself upon the mine itself." (Vol. iii., pp. 128, 129.)

We have already alluded to the absurd *punctuation* of the translation. There are, *at least*, 20,000 superfluous *commas;* the insertion of which, in many instances, perverts the sense of a whole sentence.

The translator has, throughout, followed so literally and slavishly the exact idiom and phraseology of the original, as, in numberless instances, to make very bad English out of very good French. We will take just one example at random.

"Does the magnetic field really exist, as the learned philosopher *conceives it to be*, namely, independently of the bodies by which its existence is made manifest?" (Vol. II., p. 46.)

In thousands of sentences we have the word "that" where "which" would have been much more appropriate, and in many others it is superfluous (as, for instance, vol. i., p. 420: "If, therefore, there are two currents developed in the same conductor, and *that* these currents produce the same deviation in the galvanometer, and *that* one determines a more powerful physiological effect, &c., &c.") As to the *punctuation*, one specimen shall suffice. Speaking of two stations telegraphing to each other, we read, "It is necessary that the one, who receives should know well who is sending to him;" &c.—the *comma* between the words "one" and "who" being a specimen of the way in which "commas" are used, or rather abused, in every page of the three volumes. Of course a few dozen instances might be attributed to printer's errors; but when we have the same thing repeated at least a dozen times on every page of the 2,300, of which the work consists, we can only ascribe it to some peculiar views of Mr. Walker's own on the subject of punctuation. He understands the science of Electricity quite well enough for his office of translator, but his knowledge of the French and English languages might be improved.

We have one word, also, to say to the publishers. If they had any regard to the convenience of the reader they would not have issued the work in the very inconvenient form in which it appears. The second and third volumes are of most unwieldy bulk, and ought to have been separated into a greater number. The price, too, of the English Edition is more than double that of the French; at least, if the second and third volumes of the latter edition are published at prices proportional to that of the first volume, which was *nine francs*, the price of the first volume of the English edition being eighteen shillings. We should like to know what share of this enormous addition to the French charge *goes to the Author?*

PATENT LAW AND PATENT OFFICES.

We are able to state, on good authority, in reference to our remarks on the above subjects in our last Number, that the Solicitor-General did not intend to impute the origination of the Duncombe Patent Bill to patent agents generally, but rather to some person calling himself a patent agent. His opinion of the matter was, in fact, pretty nearly coincident with our own. We have reason to believe that, should an opportunity offer, he will not hesitate to correct the impression produced, by explaining the subject in the House of Commons. His speech must have been misreported.

If any of our readers should judge the remarks which we made upon patent agents too hard, or uncalled for, we would strongly recommend them to examine the schedule of a Mr. Alexander Prince, at the Insolvent Debtors' Court, Portugal-street, Lincoln's-inn. They will there learn that the insolvent, who has been practising for a comparatively short period under the designation of "patent agent," has failed with liabilities exceeding 20,000*l*., and that several of his receipts have consisted of large sums received from unfortunate patentees *for business never completed*. Numerous newspaper proprietors, also, who had been favoured with Mr. Prince's advertisements, figure largely on the wrong side of his schedule. The insolvent has, we believe, been down to the Court at Canterbury, and passed quietly, and will probably soon be again at the service of inventors.

The accuracy of one of our statements

respecting the privileges granted to patentees, has been questioned, even by persons who understand much of Patent Law. We said:—"The monopoly granted to a patentee often deprives the public of the benefit of an invention for several years; for an improvement is often made by two or more persons at a distance simultaneously, or nearly so, and he who first obtains protection for the improvement is empowered to prohibit another who has also invented it, both from using it himself and from presenting it to the public." This statement is literally true. Let us take an example. Mr. Maudslay and Mr. Penn are both makers of marine steam-engines. Suppose, now, Mr. Maudslay contrives an improved arrangement of engine designed, say, for a light draught gun-boat, and obtains protection for the same; and suppose, also, that "simultaneously, or nearly so,"—that is at the same time, or just before, or just afterwards,—Mr. Penn, turning his mind to the same object (under a similar contract, for instance) decides independently upon using a like arrangement. Can he do so? Can he, without paying Royalty to Mr. Maudslay, construct and fit such an arrangement of engines in any vessel or vessels which he may have contracted to supply with suitable engines? Decidedly he cannot. Can he make the public a present of what he has invented? No. Mr. Maudslay, by his protection, would have become "empowered to prohibit" Mr. Penn "both from using it himself, and from presenting it to the public." We are aware that, when an inventor can prove that he had practically employed an invention prior to the date of a patent, the patentee is not then empowered to stop him in the use of it. But that is a particular case, and must have the word "use" or "employment" applied to it in a limited sense. What we stated, and what we maintain is, that every person who obtains a patent for an invention, thereby secures the right to prohibit every one from using it, except by license from himself, even although other persons may invent, or may have invented, it. If they have previously *used*, as well as *invented* it, and can prove the fact, the case is then altered, as we have before mentioned.

THE WORK OF THE SCULPTOR.—It has recently been calculated that "the aggregate of weight thrown on the production of a life-sized statue in marble" is not less than 155,520 tons, or 17,318,240 lbs. avoirdupois. When looking at a delicate female statue, in white marble, who would judge she had been produced by such means?

THE ATLANTIC CABLE.

[THE following letter reached us on Wednesday morning, after this Number had been made up, but it throws so much light upon the practical part of the question, and is so well and justly calculated to inspire increased confidence in the great undertaking soon to be attempted, that we have not hesitated to remove other matter for the purpose of giving place to it. At the same time we reserve our judgment upon one or two points incidentally mentioned in it.—EDS. M. M.]

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—In your last number Mr. Longridge expresses two objections to the machinery lately constructed by Messrs. Easton and Amos for paying-out the Atlantic cable; in the first place because irregularities in the bottom may suddenly demand cable, and require a gradual increase of strain; and, secondly, because the motion of the ship's stern will give rise to a variable rate in the sheaves.

The former objection is invalid, because there are no changes in the depth throughout the route to be followed so sudden or great as to produce that rapid rushing out of the cable which he forebodes; indeed, the greatest variation in depth between Ireland and Newfoundland, where the deep water is first reached from this side, was passed over so successfully during the attempt of last year that the run of the ship by observation, during the twenty-four hours in which this occurred, was 111 miles, while the cable laid was only 118½ miles. I give the total run between the periods of observation, as the run by reckoning for the exact time when it took place could not be implicitly relied upon, but the loss of only six per cent. over the length laid during the day, the chief part of which was in a depth of two miles, is sufficient to show that no difficulty such as Mr. Longridge anticipates was in practice experienced from the greatest change to be encountered.

But if we put aside the knowledge which has been acquired of the depth of the water and nature of the bottom—leaving the numerous soundings taken by the *Cyclops* last autumn, and by the *Arctic* the year before, out of the question—and imagine the possible existence of some great ravine or precipitous declivity, the machine is perfectly adapted to the emergency, for the strain can be augmented by a hundred-weight at a time, or even less if it were desirable to proportion the strain to the depth with still greater nicety.

The second objection has evidently arisen

from imperfect information as to the appliances to be employed. The power of compensating for any degree of unequal drag occasioned by the pitching of the ship is completely afforded in the machinery in question, if necessary; but the day's run to which I have alluded above proves that in ordinary weather it is needless; indeed, the extent of variation under any circumstances is generally overrated. The cable cannot ever be said to "shoot away," and although it is true that the increased motion of the ship in a heavy sea originated the mishap of last year, the immediate cause was the rigidity of the break and want of proper manipulation at the time.

The specific gravity of the cable and the smallness of the conductor are also censured by Mr. Longridge. No one can doubt the desirability of getting the lightest and strongest cable for deep sea purposes *provided that it does not infringe upon other conditions* (and in fact the present Atlantic cable is much lighter than any line of submarine telegraph in operation at this time), but no new form of cable has yet been designed and subjected to proof, even on the smallest scale, that fulfils the necessary requirements.

I understood Mr. Longridge to say, respecting the conductor, in the discussion to which he refers, that he was not sufficiently acquainted with electrical matters to pass any judgment on the point, and a specimen shown to me as the kind of rope which he would prefer had as its conductor an iron strand, the disadvantages of which are manifest enough. I have not time to enter into the question fully, nor to state my opinion in regard to the electrical suggestions contained in your article upon the Atlantic cable, but every one taking an interest in telegraphs must feel deeply indebted to Mr. Longridge for the manner in which he treated the subject in his paper of a recent date from a mathematical and mechanical point of view, as well as for his letter of last week to you.

Yours, very obediently, B.

May 24, 1858.

THE STABILITY OF FLOATING BODIES.

A letter from "Nauticus" on the above subject, in reply to "A Mechanic," has been in type for nearly a fortnight, and a letter from Mr. Rawson, in reply to the same gentleman, came to hand early this week; but the pressure upon our space is so great that we are compelled to defer the publication of both. We hope to find room for them in our next, as the subject is important as well as difficult.

FRENCH KNOWLEDGE OF THE ENGLISH.

In announcing the fact that Sir John Pakington, the First Lord of the Admiralty, intended placing vessels belonging to the Royal Navy at the disposal of men of science, should they require them for the purpose of proceeding to South America to make observations during the great eclipse of the sun which will be favourably observed in Peru and other neighbouring countries, the French scientific journal, *Cosmos*, falls into a singular error. The Editor is the Abbé Moigno, a highly cultivated man, and one who has, probably, a better knowledge of English scientific literature than nine-tenths of his countrymen, and yet, from the mere remote resemblance that exists between the sounds of the names of Sir John Pakington and Sir Joseph Paxton, he commits the ludicrous error of attributing the creation of the crystal palaces of Hyde Park and Sydenham to the respected gentleman who now rules the navy. "Sir John Pakington," he says, "l'illustre créateur du Palais de cristal d'Hyde Park et de Sidenham, animé d'un sentiment de libéralité aussi spontanée qu'intelligente, a offert de placer des vaisseaux à la disposition de la science pour l'observation de la grand éclipse de Septembre prochain," &c. The announcement is borrowed from the London *Athenæum*, and the allusion to the palaces doubtless arose from a friendly desire to keep alive the recollection of an Englishman's renown. The circumstance indicates, however, how little some of the most eminent of our French friends understand of English society and English citizens.

REAPING MACHINES.

Gentlemen,—I regret to see that, in an article in your last number, it is stated "that we are indebted to Americans for the only two kinds of reaping machines which promised to become permanent elements of our agricultural apparatus,"—inasmuch as not only is it an English invention, but it was first given to the public in your own pages in vol. v., 1826. As described by your correspondent and the inventor, Mr. Ogle, it was not only in conception, but in the general arrangements, the machine of the present day. Some improvements in matters of detail it has received from the Americans, and greater still in the additions thereto since its reappearance in this country, but fundamentally it is as it was first projected. In the original, the corn was delivered either at the side by a man with a fork, or mechanically at the tail by the falling of a hinged

platform, when sufficient had accumulated for a sheaf. Even the revolving reel was employed, and the knife acted against fingers with a *drawing* cut—too much so, perhaps. On the other hand, in the supposed American improvement of the knife, there is the opposite fault of a too great approach to a *chopping* cut. Messrs. Burgess and Key appear to have taken a medium course, and so to that extent have gone back to the original idea.

How strange it is—in respect to its singularity at least—that the English seem to take a delight rather in the abnegation than in the display of an overweening spirit of nationality, and in their anxiety to do justice to other people often fail in doing justice to themselves!

I am, Gentlemen, yours, &c.

BENJ. CHIVERTON.

STEAM-SHIP PERFORMANCE.*

GENTLEMEN,—Mr. Atherton is indeed indefatigable in recommending the use of his formula as a test of the economy of steam vessels; while, at the same time, he never exhibits the courtesy in explaining the anomalies presented by the derived coefficients. In your last number I perceive that "Nauticus" has discovered the same anomaly as was pointed out by Mr. R. Armstrong nearly a year ago (No. 1767), which Mr. Atherton has never deigned to explain; to myself such silence implies either the impossibility of granting the explanation, or that the formula is inapplicable for the purpose designed, *viz.*, reducing steam transport economy to a simple mathematical calculation.

With respect to the best dynamic test, "Nauticus" adopts the same common-sense view of the subject as Mr. Armstrong, *viz.*, "The dynamic performance of a steam-ship cannot be more simply expressed than by the number of tons carried by one-horse power a conceded distance;" while the illustrations of the former are not so conclusive of the absurdity of the formula as a test, as those *facts* furnished by the latter, *viz.*:—

	Speed.	Tons to 1 No. H. P.	Coefficient No. H. P.
Dauntless	10.29	4.0	322
Dwarf	10.53	1.1	276

These examples are again suggested to Mr. Atherton for an explanation, or else it will soon be universally asserted "that the *test* has been *tested*, and proved to be useless."

C. D.

* The above letter was in type before Mr. Atherton's (which will appear next week) was received.—EDS. M. M.

TERRAQUEOUS RAILWAY BETWEEN GREENWICH AND WOOLWICH.

GENTLEMEN,—Now that the project of direct railway communication between Greenwich and Woolwich is revived, I beg to call your attention to a plan to obviate all tremulous interference with the Royal Observatory.

I propose to construct an aqueduct, in which shall be placed a floating platform carrying the permanent way of so much of the line as shall be considered necessary. The platform to be connected with the terreous part of the line by hinged bridges. When the train leaves the platform the loose end of the bridge and the platform will rise, say an inch, above the level of the line, but no more, being prevented by suitable stops. When the train goes on the platform will not sink much, say an inch below the level. While the train is traversing the aqueous part of the line the water will entirely insulate it and effectually cut off all tremor. It will only be necessary to give the platform such a transverse section that it shall not be much affected by the difference between the heavy and the light part of the train.

J. SIMON HOLLAND.

Woolwich.

STRENGTH OF MATERIALS.

GENTLEMEN,—The fact recently mentioned by General Thompson relative to this subject is certainly a somewhat important one; nevertheless it is not true that such union affords greater strength than we should be led to expect, unless the manner of dividing a crust is attended to. Thus, if we place the soft part uppermost, the difficulty of dividing a crust will (although not necessarily, but merely from our mode of procedure) be much greater than if the reverse were the case. If the hard side is at the top we divide it as easily as if the soft and hard parts were bitten through separately, so that your correspondent's remarks require a little qualification. His practical suggestion is good, but care should be taken that the soft material is outside, as far as maximum resistance is concerned.

The rationale of this phenomenon appears to be this:—The force of a moving body is considerably lessened by coming in contact with another which offers a very small, but continuous resistance. It is thus that the atmosphere offers such resistance, and that a bullet or cannon-ball cannot pass through a hung-up blanket. Now, when the force of the teeth is first

exercised upon the soft portion of a crust, it is generally to some extent ineffectual, or rather more than effectual, because it is disproportional to the resistance offered. The teeth meet the hard portion, and being, as it were, unprepared for this increased resistance, a sense of difficulty is experienced, although the force already exercised in dividing the soft portion may be, and most probably is, sufficient for this. Consequently, it appears that the toughness experienced is more imaginary than real, and could, even when the soft part is uppermost, be greatly ameliorated by diminishing the force employed to separate it.

When the hard part is uppermost, no such difficulty can, of course, be experienced.

Yours, &c., J. A. Davies.

April 27, 1858.

THE NEW FOG SIGNAL.

Gentlemen,—I have read with much interest Mr. Holland's letter, which appeared in your last number, in which he proposes a new fog signal of his own invention. I doubt much whether a more effective method of "signalling" could be contrived, for the effects produced by adopting it would undoubtedly be such as the engineer, and also the passengers, "could not mistake." Probably the same effects would be produced by laying a thick bar of iron across *both* rails, instead of across one, as the greater the jolt the greater would be the effect! Or a cow might be placed on the line (as in the late accident on the Trent-valley line), which would, no doubt, produce the same "effect." Seriously speaking, I hope such Companies as adopt your correspondent's method of signalling will advertise the public thereof, in order that their lines may be avoided, by, amongst others,

Your obedient servant,
J. T.

May 24, 1858.

AN IMPROVED ANEMOMETER.

Gentlemen,—In the description of this (No. 1812) the word "steam" should be "stream." It is a rather singular mistake, inasmuch as a "steam" gauge consisting of a "framework of sails" would be a rather remarkable apparatus.

Yours, &c., J. A. Davies.

May 18, 1858.

IMPROVED CLOCK FACES, ETC.

Gentlemen,—Several improvements might be made with respect to the faces, &c., of clocks. Were the faces to be painted black, or a dark blue, and the letters white, the eye would be less distressed in gazing at them, and mistakes in observing the exact time prevented. To persons of weak sight the white face is a great source of discomfort. The minute-hand should be a plain rod tapering to a point, and reaching the outermost margin of the figure circle (as is generally the case now), while the hour-hand should also be a plain rod, but ending with a bulbous head or extremity, so as to be readily distinguished, and *not* reach farther than the inner margin of the figure circle. If the figures were the simple numerals ordinarily in use in our commercial transactions, they would be more easily recognised than the Roman numbers at present *generally* employed. Errors constantly arise with the latter. The three may be mistaken for four, the six for seven, the seven for eight, and the eleven for twelve; but if the simple numerals were used this could not happen, as they are all so entirely different in shape. In the hope that this may be worth a place in your Magazine, which has an interest to amateurs in science like myself, whose avocations are other than of a mechanical nature,

I am, yours very respectfully,
Scintilla.

May 22, 1858.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Cartwright, H. *Improvements in the construction of steam-engines.* Dated Aug. 21, 1857. (No. 2223.)

These improvements consist of a particular mode of constructing and arranging the steam cylinders, and are chiefly intended to be applied to such engines as have their steam supplied to the cylinders by the steam cocks patented by Mr. Cartwright, 2d June, 1855.

Dauglish, J. *Improvements in the preparation of dough.* Dated Aug. 21, 1857. (No. 2224.)

This invention relates to certain methods of improving the use of carbonic acid gas under pressure in the preparation of dough.

Dufau, J. *Improvements in regulating or controlling railway and lighthouse signalling.* Dated Aug. 22, 1857. (No. 2225.)

This relates to apparatus for indicating, by electricity, whether railway, light-house, and other signal lights are turned in the

proper direction, and whether the lanterns of such are lighted or not.

DIRCKS, H. *An improved fire-escape.* (A communication.) Dated Aug. 22, 1857. (No. 2228.)

This consists of a long sack or bag fastened to the window sill. By repeatedly turning the lower end round, the sack is twisted like a rope, and nearly closed up to the top, when a person or property may be placed within, and gradually lowered by untwisting the sack, and so on as often as required.

STEELL, G. and W. *The better construction of a double-backed double boiler for heating with hot water, churches, horticultural buildings, mansions, theatres, &c.* Dated Aug. 22, 1857. (No. 2229.)

This cannot be described without engravings.

GATTY, F. A. *Improvements in the manufacture of chlorine and sulphuric acid.* Dated Aug. 22, 1857. (No. 2230.)

This relates,—1. To producing black oxide of manganese from the chloride and sulphate of manganese generally left as residuums in the manufacture of chlorine, by transforming the said chloride and sulphate into nitrate of manganese, or by mixing them with nitrate of soda or nitrate of potash, and then heating them until all the nitrous and nitric acids are driven off. 2. To applying the vapours or gases disengaged during the decomposition by heat of nitrate of manganese, or the mixture of the salts of manganese with nitrate of soda, or nitrate of potash, in the manufacture of sulphuric acid, by introducing the said vapours or gases into the leaden chambers either wholly as they are driven off, or only the part which does not condense in passing through a condensing apparatus.

LEVISON, L. *Improvements in mechanical purchases to be employed for hoisting purposes, and for extracting roots and stumps of trees.* (A communication.) Dated Aug. 22, 1857. (No. 2233.)

This apparatus consists of a main lever mounted on wheels at the ends, and furnished with certain loops and loop-chains by means of which a raising action is gradually exerted.

GARDINER, P. G. *A new and useful process in the treatment of cast-steel while passing from the molten state into that of being hardened or tempered, and which, with certain variations, is applicable to the making of tools, instruments, axes, wheels, or ingots.* Dated Aug. 22, 1857. (No. 2234.)

For making manufactured steel of a peculiarly soft, tough, and malleable quality, the patentee first prepares moulds of a material which will not adhere to the melted metal. These moulds are then heated to an intense heat, nearly to that at which the steel melts, and the melted metal is poured into them, and kept heated to this high degree from six to eight hours, and after the heat slowly subsides, until the steel in them has fairly congealed and is at a cherry red heat; then the steel is removed expeditiously from the moulds, and immersed in a cistern of oil heated to 700° Fah.; the oil must be kept at that heat for several hours, and then permitted to become gradually quite cool.

BLANC, F. J. *An improved tyre for the wheels of railway carriages, engines, and tenders.* Dated Aug. 24, 1857. (No. 2235.)

The patentee claims,—1. The constructing the tyres of wheels of railway carriages, engines, and tenders of an iron and steel ring joined together as described. 2. The arrangement of apparatus for welding the iron and steel ring together to form a tyre, as described.

DAVIS, G. D. *Improvements in the construction and in the method of working windlasses.* Dated Aug. 24, 1857. (No. 2236.)

The patentee describes certain improvements which enable the windlass to be used for two different purposes at the same time, and to give two rates of speed in raising anchors, &c., one being a greater rate of speed than is ordinarily attained, and the other a slower rate.

HAMILTON, A. *Improvements in the construction of, and in mooring buoys, beacons, floating lights, and other floating vessels.* Dated Aug. 24, 1857. (No. 2239.)

Buoys, beacons, floating lights, &c., are here made annular or of a ring shape. It is preferred to make them in sections, each capable of floating alone, the sections being fitted so that they may be readily removed and replaced; and when of large diameter, such structures may be made with openings to allow of boats passing into and from the interior. The mooring chains are made fast to the body or the inner side thereof, and at or near the centre of the open space. The apparatus for mooring consists of a structure to which an amount of chain is attached sufficient to cause it to sink to any required depth, and the beacons, &c., instead of being moored in the usual way, are secured by a chain suspended from some part within themselves, and having the other end attached to the submerged body. For rendering the position of a buoy, beacon, &c., when moored secured in a heavy sea, the inventor has contrived a "self-

acting break" and a "self-acting screw or paddle."

MACAULEY, T. *Improvements in apparatus for condensing the noxious vapours arising from varnish making and other like manufactures.* Dated Aug. 25, 1857. (No. 2241.)

In one arrangement of the melting or running pots, a close fitting lid is required, in the centre of which is an aperture coned inwards, through which passes the stirrer. The cone has at bottom a plug, moveable upwards out of its socket. In the top of the lid is also fitted a trial or gauge aperture, having a socket and a perforated plug, through which passes, and to which is fixed, the gauge rod terminating in a small basket or short cupped tube. The lid and head are furnished with inner channels to convey off condensed vapour, and the lid has an aperture to which is connected a wide bent tube supplied with a socket; so that it can be attached to a refrigeratory worm, set in a water vessel, and the liquid resulting from the condensed vapour in the refrigerator can run from it into a common receiver.

PRESTON, F. *Certain improvements in apparatus to be applied to the spindles of machines for preparing, spinning, and doubling cotton, and other fibrous materials.* Dated Aug. 25, 1857. (No. 2242.)

This consists, 1st, in making the tubes and partial tubes with perforations, whereby they are made lighter, and the vibration of the spindle is avoided. 2. In making the spools or bobbins used in slubbing and roving frames of two or more pieces of metal soldered together. 3. In making the bobbins, when a drag band is employed to give friction, in two distinct parts connected by a catch box, so as to remove the full bobbins without displacing the drag band.

GEDGE, J. *Improvements in envelopes for letters and other documents.* (A communication.) Dated Aug. 25, 1857. (No. 2243.)

This consists, 1st, in making the envelope so that a letter can be introduced after the envelope is sealed. 2. The envelope is so made that it can be opened without breaking the seal. 3. The preservation of the envelope when opened, with post mark, stamp, seal, and address intact, it forming also a cover for the letter, and being attached to it. 4. In some cases it is closed by a postage stamp.

HEMMING, G. W. *Improvements in apparatus employed in delivering submarine telegraph cables from ships.* Dated Aug. 25, 1857. (No. 2245.)

The object here is to make the supply of cable vary continuously with the demand, by means of travelling sheaves, so as to prevent the strain varying beyond certain limits above and below its average amount for the time being, and at the same time to obviate the necessity of easing the breaks, and the consequent irregularity in the rate of delivery from the coil, and thus to lessen the risk of fracture, and the waste caused by slack.

NICHOLLS, W. *An improved apparatus for warming milk.* Dated Aug. 25, 1857 (No. 2247.)

This consists of a portable vessel into which hot water is placed, the temperature of such water being maintained by placing heaters within the vessel, after the manner of the ordinary tea urn. The apparatus is placed in the vessel containing the milk, and a thermometer is held therein to ascertain when it has been sufficiently warmed.

PARRY, H. *Improvements in the construction of rails for railways or tramways.* Dated Aug. 25, 1857. (No. 2248.)

The patentee forms the ends of the rails for a few inches either of a solid rectangular shape, so as to lap over each other and form a joint, or in one end of some of the rails he forms a mortice, and the other of the rails with tenons fitting into the mortices, so as to form a joint; or he connects the ends of the rails together after the manner of a puzzle joint. The ends of the rails may be held together by bolts and nuts.

RONALD, J. *Improvements in laying or depositing submarine telegraph cables.* Dated Aug. 25, 1857. (No. 2249.)

This consists in surrounding the telegraph wires with a cable formed of cocoa fibre, or coir, manilla, &c., the specific gravity of which is sufficiently light to support themselves and the telegraph wires until they absorb sufficient moisture to increase their specific gravity, and thereby allow the cable to sink to the bottom.

PENN, J. *An improvement in apparatus for taking the thrust of screw and submerged propellers.* Dated Aug. 25, 1857. (No. 2250.)

This invention was described and illustrated at p. 241, No. 1805, Vol. 68.

TUCKER, J. J., and G. BLAXLAND. *Improvements in steam boiler and other furnaces.* Dated Aug. 25, 1857. (No. 2251.)

This invention was described and illustrated at p. 193, No. 1803, Vol. 68.

STAUFEN, W. *An improved method of treating agava Americana, or Mexican grass, and the manufacture of a new fabric therefrom.* Dated Aug. 25, 1857. (No. 2252.)

This relates, 1st, to a previous patent of

the patentee, dated 2d Nov., 1855, and consists in treating the fibres after having been prepared with an alkali or alkalies, and before or after being baked with gum or gummy matters, size, or glue, in order to impart additional stiffness and elasticity to them. The patentee manufactures the new fabric wholly or partially with fibres of the agava Americana, after having been prepared with alkali and baked, by weaving or knitting by any of the well-known methods.

NEWTON, A. V. *Improvements in machinery for preparing, roving, spinning, and twisting fibrous substances.* (A communication.) Dated Aug. 25, 1857. (No. 2253.)

This relates to a series of operations for preparing fibrous substances for spinning, by which the substance to be operated upon may be drawn, and any required twist imparted to it, so as to obtain either a fine thread or a coarse roving, sliver, or ribbon of great regularity.

COMPLETE SPECIFICATIONS FILED WITH APPLICATIONS.

GILMOUR, G. *A new and useful contrivance or mechanism for shackling or attaching another anchor to the chain of an anchor to which a vessel may be riding, his said invention being termed by him a "second anchor shackle."* Dated Mar. 27, 1857. (No. 860.)

QUINCHE, A. J. *Improvements in apparatus for counting, registering, and indicating the distance travelled by vehicles.* Dated Mar. 31, 1857. (No. 883.)

LEE, R. E. *A portable printing apparatus, adapted alike for moveable type, lithography, and copper-plate.* Dated Apr. 1, 1857. (No. 898.)

BARRINGTON, G. *Making the stop funnel for the prevention of waste of liquids whilst bottling or transferring them from one vessel to another.* Dated Apr. 6, 1857. (No. 962.)

None of the above four inventions can be described without engravings.

LARNAUDES, J. F. V. *For the disinfection and deodorisation of animal and vegetable substance.* Dated Apr. 8, 1857. (No. 983.)

This consists of a liquid disinfectant composed of sulphates of zinc and copper mixed with water.

BARLOW, C. *A mechanical apparatus for regenerating the impulsive force of any motive power.* (A communication.) Dated Apr. 20, 1857. (No. 1108.)

This machine has force generated in it by the travelling of heavy iron balls or weights in and around helical spirals, which are wound round cylinders of different diameter. These cylinders are set in motion by the gravitation of the heavy weights or balls when set in motion, which motion is of an oscillating rotary kind on account of the shafts being inclined.

BOUSFIELD, G. T. *Improvements in collapsible boats and pontoons.* (A communication.) Dated Apr. 30, 1857. (No. 1224.)

The boat or pontoon described is capable of being expanded so as to carry crew, passengers, and cargo, and of being collapsed, or shut up, so as to occupy but a small space when stowed away. It resembles a collapsible boat patented by N. Thompson, 23d Feb., 1855, but is less liable to capsize when opened and ready for use; is also stronger, of less weight for any given size, and has more room for stowage.

SIEVIER, R. W. *An improvement in the mode of treating saccharine juices in the manufacture of sugar.* Dated May 5, 1857. (No. 1266.)

The patentee claims,—1. The use of sulphurous acid gas in the commencement of making sugar applied to the pulp and juices of beet-root or cane before boiling, and then adding lime to excess to defecate well the juice, and neutralize that excess, in the way described. 2. The use of sulphurous acid gas, as stated, in the manufacture of molasses. 3. The use of vessels made of wood, stone, slate, glazed metal or earthenware for boiling the juice of beet-root, sugar cane, &c.

MORSE, G. W. *An improved breech-loading fire-arm.* Dated May 13, 1857. (No. 1357.)

The inventor describes a gun which requires engravings to illustrate its construction. What the inventor claims is, the application to the breech slide of nippers moveable relatively to the said slide, and operated by means whereby the nippers may be moved irrespective of the breech slide, and caused to grasp the cartridge, and subsequently withdraw it from the gun while the breech slide is being retracted. He also claims in its combination with the barrel and the sliding breech closer an open slot or passage, so made and arranged directly in rear of the barrel as to enable the cartridge case, after being drawn out of the barrel, to drop down and out of the gun, when the latter is held so that the trigger shall be below the barrel. Also, a combination and arrangement of nippers, a sliding breech block, a percussion slide or pin, and the cock of the lock, whereby, after the cartridge case has been drawn out of the gun, the force of the main spring shall be so caused to act as to expel the cartridge case

upon the breech block immediately on such case being relieved from the grasp or hold of the nippers. Also, an arrangement and application of a cock or hammer, a sliding breech closer, and a moveable clasp separate from the trigger guard, the same being so arranged as to enable the hammer to be set to cock by the breech slide on its percussion pin while such separate clasp is being retracted as set forth. Also, a valve and its seat in combination with the percussion pin and the breech slide, in order that when the said pin is driven backward during the explosion of the cartridge the valve may close on its seat and prevent the escape of gas into the pin passage and from thence into the lock. Also, a certain cartridge or charge carrier constructed as described.

VASSEROT, C. F. *A typographical numbering apparatus.* (A communication.) Dated May 19, 1857. (No. 1400.)

SHARP, G., and W. ELDER. *Improvements in steam hammers and machinery for forging iron and other substances.* Dated May 20, 1857. (No. 1419.)

Neither of the above two inventions can be described without engravings.

GEDGE, J. *Improvements in constructing gas retorts in the furnaces of steam engines, or other furnaces.* (A communication.) Dated June 9, 1857. (No. 1612.)

The principal object of this invention (which cannot be described without engravings) is to employ the caloric generated in furnaces in the distillation of gas.

HALE, T. *A new and useful or improved apparatus for heating and ventilating a building.* (A communication.) Dated June 9, 1857. (No. 1617.)

This invention cannot be described without engravings.

TURNER, T. *Improvements in apparatus to be employed as an alarm and detector in cases of burglary.* Dated June 12, 1857. (No. 1658.)

This consists of certain improvements upon an invention patented 9th Dec., 1856, by J. R. Scartliff. These improvements cannot be described without engravings.

BOURNE, J. *An improved steam train for navigating shallow rivers.* Dated June 26, 1857. (No. 1795.)

This invention very much resembles that described in the specification of the patent No. 4, 1857. See *Mechanics' Magazine*, p. 261, No. 1779, Vol. 67.

BOUVERT, J. J., and F. I. J. PASCAL. *Improvements in smoke-preventing apparatus.* Dated July 23, 1857. (No. 2023.)

This consists in presenting the combustible material to the action of the furnace by submitting it to a complete torrefaction in order to liberate the incombustible gases, and to use immediately the combustible gas for the benefit of the furnace which has produced them, by collecting and conducting them directly into the incandescent part of the fire.

CHAMBERLAIN, A. P. *Improvements in machines for cutting corks and other substances.* Dated Aug. 20, 1857. (No. 2214.)

This invention cannot be described without engravings.

HODGES, H. *Improvements in the manufacture of gunpowder.* Dated Aug. 22, 1857. (No. 2227.)

This consists in mixing the ingredients of gunpowder in the ordinary way, and in then putting them into a suitable pot or vessel, into which sufficient steam is admitted to damp the composition, dissolve the saltpetre, and soften the sulphur. By these means the saltpetre is more intimately blended with the other ingredients than ordinarily. During the process the composition should be kept well stirred up, until the whole of the saltpetre is dissolved, when it is taken out, and, when sufficiently dry, is ground under the mill runners in the usual way.

BARDEN, J. S., A. WATKINS, R. H. HINKLEY, and D. F. CHILD. *Certain improvements in engines for hydraulic or various other useful purposes.* Dated Sept. 17, 1857. (A communication.) (No. 2410.)

This invention cannot be described without engravings.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

MESSMORE, D. *An improved method of dressing mill-stones for hulling rice and other grain having hulls or husks.* (A communication.) Dated Aug. 20, 1857. (No. 2216.)

This consists of a method of arranging the grooves of mill-stones so as to prevent choking.

HALL, W. K. *Improvements in apparatus for measuring and registering the speed and leeway of ships, and indicating the distance accomplished.* (A communication.) Dated Aug. 21, 1857. (No. 2218.)

In this invention a drag or flap valve hangs from a box near the keel, and assumes a position more or less inclined in proportion to the resistance of the water occasioned by the passage of the vessel. The motion of the drag is communicated by a rod and a rack and pinion to a pointer, that indicates on a suitable dial the speed of the ship. The distance accomplished by the vessel is indicated by clockwork, which, at regular intervals, causes the speed momentarily indicated to be progressively

registered on a dial by the motion of a cam. For indicating and registering the leeway, a wheel with floats is placed in an opening in the keel so that the passage of the water occasioned by a motion of the ship in a transverse direction causes the wheel to revolve, and communicates the desired indication to a dial, by a screw and wheel combined with the apparatus previously described.

M'Master, J., and W. Wilson. *Manufacturing liquid farm manure and rendering it as efficient as any artificial manure, at a small expense to the farmer.* Dated Aug. 21, 1857. (No. 2220.)

1. To cattle urine there is added a mineral found in the farm of Caldons, Stoneykirk, or gypsum, alum, or other mineral, and sulphuric acid; when settled down the whole is filtered with peat charcoal or carbon. 2. The liquor, when filtered, is conveyed to an air furnace for evaporating and condensing the ammonia with a mineral acid obtained in the process. 3. The salts in the filter box are then mixed with the ammonia, and the whole precipitated together. 4. The salts of the urine are next added together and evaporated till dry, when a powder is obtained which as a manure is similar in its effects to guano. 5. For effecting the above process a suitable apparatus has been invented.

Clark, H. *Improvements in the lines of steam vessels, and in the method of propelling the same.* Dated Aug. 21, 1857. (No. 2226.)

This consists, 1st, in forming vessels with such lines that when propelled their tendency shall be to skim over the water, *i.e.*, with a flat bottom throughout a considerable portion of its length, while the bows and the run are a continuation of the same flat surface, but at an angle of inclination. The bow and stern are of the same breadth as the midship section. The improvement in propelling consists in the application of the Archimedian screw, above deck in the air, and in causing it to rotate at a high velocity.

Settle, T. *Certain improvements in looms for weaving.* Dated Aug. 22, 1857. (No. 2231.)

This consists in an arrangement of parts for raising and lowering the drop boxes when two or more shuttles are employed. The inventor connects the drop box to a lever acted upon by a cam having two or more elevators and depressers, according to the number of shuttles. This cam is turned partly round in one direction or the other by vibrating catches, acting either at the upper or under side of a boss with projections. The vibrating catches are worked from the tappet shaft, and are raised and lowered by a jacquard or index, or by a lever actuated by an endless chain of links with elevators and depressers.

Pinchbeck, J. *An improvement in screens for dressing or separating corn or other grain.* Dated Aug. 22, 1857. (No. 2232.)

This consists in the construction of screens or sieves, whereby the space between the wires of such screens may be altered to suit the various sizes of grain to be operated upon.

Newton, A. V. *Improvements in temples for looms.* (A communication.) Dated Aug. 24, 1857. (No. 2237.)

To prevent the shrinking of the fabric as it is manufactured, the improved temple is formed of two short rollers provided with radial pins on their periphery. These rollers are mounted one on each side of the loom, and the pins take into the fabric near the opposite selvages. The axles of these rollers are carried by compound brackets, so arranged as to admit of the rollers being deposited at an angle, according to the amount of drag required to be put on the fabric. They are also capable of being shifted laterally according to the width of the fabric. Over the rollers covers are fitted, for keeping the fabric as it passes over the rollers closely in contact therewith.

Rickett, T. *Improvements in machinery for sowing seeds and manure.* Dated Aug. 24, 1857. (No. 2238.)

At the fore part of a carriage is a fixed incline, at the front edge of which there is a sharp edge, which divides the soil in a horizontal line below the surface. This incline has, at each side, a raised edge, of greater depth than the forward edge works below the surface, and endless chains which at intervals have blades affixed, and which move the earth up the incline, and cause it to pass beyond the upper end, where there is a descending incline, down which the raised earth descends on to a screen, the clods or lumps being broken by a suitable roller as they descend.

Fox, S., and J. W. Slater. *An improved metallic compound applicable to the manufacture of various useful articles.* Dated Aug. 24, 1857. (No. 2240.)

This consists in combining fine or foreign zinc with lead and tin in certain proportions.

Riley, E. *Improvements in looms.* Dated Aug. 25, 1857. (No. 2244.)

1st. In ordinary looms (of one shuttle) the inventor uses a finger which extends through the shuttle box, and presses against the shuttle, producing the same effect as the swell. 2d. He makes the projection on the

frog, against which the swell finger acts, broader and deeper than hitherto, so that it may have a slot for the end of the finger to enter, a thickened part of which finger presses against the frog, the hole guiding the finger, and preventing its slipping or bouncing up. 3d. In looms where two or more shuttles are used he employs an arm with a roller at the end, in front of the box above the lathe, for keeping the shuttles in their places when they are not required to work; and if the shuttle should be partly out of the box when rising or dropping the arm, presses it into its place. He also uses a pulley or lever below the lathe to produce the same effect. The arms are furnished with springs or weights, and obviate the necessity of springs for acting on the swells. 4th. For making selvages at any intermediate part of the loom when two or more pieces are woven in the same width of the loom, he uses a cutter for each piece for cutting the weft betwixt each selvage, and a finger for turning each weft thread into the cloth at each selvage; as the loom beats up the cutters and fingers act simultaneously, affording the means of weaving two or more pieces of cloth with selvages, either in hand or power looms.

JAMES, C. C. *Improvements in propelling vessels.* Dated Aug. 25, 1857. (No. 2246.)

This relates to the direct action of the pressure of steam upon the water. The inventor employs cylinders projecting from the stern of the vessel, and into which the external water has free egress and ingress. He places each water cylinder in a direct line with a steam cylinder placed inside the vessel. These cylinders may be in one piece, or suitably united by stays. Each cylinder is furnished with a piston, and has a piston rod which is common to both pistons, and connects them rigidly together. The inventor considers that on these pistons being worked the vessel will be thrust forward.

NEWTON, A. V. *A mode of varying the length and reversing the direction of the throw of eccentrics, applicable to the reversing gear of locomotives, and expansion gear of other steam engines, and to other purposes.* (A communication.) Dated Aug. 25, 1857. (No. 2254.)

This relates to applying a double oblique slide to an eccentric to vary or reverse the throw thereof, by moving the slide longitudinally to the axis of the shaft of the eccentric. It is said to be particularly applicable to the valve eccentrics of locomotives and other steam engines, supplying the place of the link motion; for, by a proper arrangement of the parts, a constant "lead" of the valve under all the required changes of condition of the eccentric is provided for.

FORSYTH, J. *Improvements in machinery for raising, lowering, traversing, and compressing.* Dated Aug. 26, 1857. (No. 2257.)

Here the inventor describes a machine in which the degree of action of the machine for the effect desired will be changed according to the different speeds at which a certain nut and screw revolve.

SMITH, J. *Improvements in machinery or apparatus for embossing woven fabrics, paper, leather, and other materials.* Dated Aug. 26, 1857. (No. 2259.)

Instead of having the engraved roller which is used for embossing in one piece the whole width of the machine, the inventor makes a number of small rollers, and by a feather-edged shaft, screw, or slot, he can remove and secure the small rollers to any position on the shaft, thus avoiding removing a larger roller from the machine, and replacing it.

PROVISIONAL PROTECTIONS.

Dated April 22, 1858.

880. William Bishop, of Boston, Lincoln, gentleman. Improvements in machinery or apparatus for ticketing or labeling spools, bobbins, or reels, for adjusting the size thereof, for sampling patterns, for printing labels or tickets, affixing postage or other stamps or labels, for cutting their edges, and dividing them into given quantities and sizes.

883. John Chatterton, of Devonshire-street, Islington. Improvements in combining and coating insulated metal conductors for electric telegraphs.

Dated April 26, 1858.

918. William Arena Martin, of Woolwich, engineer. An improved shoe scraper.

Dated April 28, 1858.

948. Lucien Tapié, of Bordeaux, retired officer of the navy. Improvements in shipbuilding.

Dated May 3, 1858.

981. Jules Albert Hartmann, chemist, of Mulhouse. Improvements in preparing and combining colours for printing cotton cloth.

983. Samuel Etchells, of Nottingham, engineer, Abraham Consterdine, of Nottingham, working smith, and Samuel Cattell, of Radford, engine-smith. A reversing water tube iron to work with single blast or double blast as occasion may require, and an arrangement of water tube irons and parts connected therewith.

985. John Taylor, of Roupell-park, Streatham-hill. Improvements in stoves and fire-places.

Dated May 4, 1858.

989. John Swain, of Hyde, Chester, ironfounder, and Matthew Swain, of Dukinfield, engineer. Certain improvements in metallic pistons.

991. Henri Lucien Meall, of St. Matthew's-place, Hackney-road, surgeon. Improvements in spring fastenings suitable to be used for dresses, brooches, and other purposes.

Dated May 5, 1858.

993. David Thom and George Aldcroft Phillips, of Pendleton, Lancaster, soap manufacturers. Improvements in apparatus for bleaching and raising oil and fat.

995. William Ross, of Glasgow, brass founder. Improvements in taps or valves.

997. John Henry Johnson, of Lincoln's-inn-fields. Improvements in signal and indicating apparatus for railways. A communication from H. Maul, of Philadelphia.

999. William Simon Hollands, of Anchor-terrace, Old Kent-road. Improvements in extracting and purifying oils and fatty matters.

1001. Thomas Holstead, of Carlisle, confectioner Improvements in machinery for the manufacture of certain articles of confectionery, which improvements are also applicable to the manufacture of biscuits and the like, and to other articles, from plastic substances.

Dated May 6, 1858.

1003. John Richards, of Moorgate-street, master mariner. Improvements in rotary pumps.

1005. John Sweet Willway, of Bristol, gas engineer. An improved arrangement of apparatuses for ringing bells.

1007. William Heap, of the Oldham road, Tool Works, Ashton-under-Lyne, tool maker. Improvements in pipe joints or couplings.

1009. Hall Ashworth, of Prestwich, Lancaster, hide and size dealer. Certain improvements in machinery or apparatus for cutting hides or skins.

1011. John Bridgman, of Hamburgh. Improvements in cooling fluids and in the application of cold.

1013. William Edward Newton, of Chancery-lane. Improvements in the manufacture of saltpetre. A communication.

1015. James Wright, of Alfred-place, Newington-causeway. Improvements in treating madder for printing and dyeing, and also in the substances and processes used in printing and dyeing with the same. A communication.

1017. William Wallis, William Langford, and James Slack, of Nottingham. Improvements in pressure gauges.

Dated May 7, 1858.

1019. Charles John Carr, of Wentworth, Yorkshire, engineer. Improvements in forge and other hammers.

1021. Richard Openshaw, of Firwood, Bolton-le-Moors, finisher. Improvements in machinery for plaiting down or folding and measuring fabrics.

1023. James Michael Duvard, of Luc sur Mer, Calvados, France, physician. An improved bed-room vase.

1025. Archibald Neilson, of Glasgow, spirit dealer. Improvements in the manufacture of boots, shoes, and other coverings for the feet.

1027. George Bartlett Coggan, of Derby. A new portable apparatus to be called a "stereoscopia," for exhibiting stereoscopic pictures.

1029. Robert Best, of Birmingham, manufacturer. An improvement or improvements in illumination.

1031. Daniel Stothard, of Lambeth, Joseph Jones, of Southwark, and David Jonas and Benjamin Woolf Jonas, of Spitalfields. An improved ship's block.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," May* 25, 1858.)

51. C. Barlow. An improved registering water meter. A communication.

55. P. Robertson. Improvements in inkstands. A communication.

57. C. E. Matson. Improvements in roughing horses' shoes.

64. H. Ingle. Improvements in printing machines.

67. C. Schinz. An apparatus for manufacturing prussiate of potash.

76. E. Hills. An improved process for manufacturing sulphate of ammonia.

86. V. De Tivoli. An improved omnibus.

88. G. A. Tremeschini. Improved methods and mechanical arrangements for applying card-board to the weaving of figured fabrics, and for arranging the card-board for this purpose.

93. O. Von Corvin. Improvements in the mode of inlaying or ornamenting in metals and other materials.

94. C. N. Nixon. Improvements in the application of screw power, such improvements being applicable to steering apparatus, capstans, windlasses, cranes, winches, and other mechanical purposes.

97. W. Muir. Improvements in stands for letter copying presses and other small machines.

100. C. Rishworth. An improved construction of spring for sustaining loads, and moderating concussion.

104. P. Robertson. Improvements in the manufacture of paints. A communication.

106. W. White. Improvements in machinery or apparatus for making moulds or matrices employed in casting metals.

107. T. Ivory. Improvements in steam boilers.

120. W. Basford. Improvements in kilns or ovens for burning or firing bricks, tiles, pipes, and pottery or earthenware, and in the mode of charging the ovens or placing or setting the articles that are to be fired therein.

139. G. P. Simcox. The application of certain materials in the manufacture of carpets.

140. W. E. Newton. A new or improved fabric, intended principally as a substitute for leather. A communication.

151. C. N. Kottula. Improvements in the manufacture of neutral soap.

233. R. W. Johnson and W. Stableford. Improvements connected with the break levers of railway wagons.

293. H. Wilde. Improvements in connecting the ends of lightning conductors, and also the ends of submarine electric telegraph cables.

390. D., R., and G. Nurse. Improvements in coating metals, and in the apparatus connected therewith.

466. B. B. Stoney. Improvements in buoys, floating beacons, and other similar floating bodies.

617. C. N. Kottula. Improvements in purifying soda leys, whereby they are rendered capable of saponifying all fatty matters or resins used in the manufacture of soap.

618. C. N. Kottula. Improvements in the manufacture of compact neutral soap.

619. C. N. Kottula. An improvement in the manufacture of neutral hand or skin soap.

694. A. P. Dadley and N. Brough. An improved buckle or metallic adjuster, for adjusting braces, belts, garters, and such like articles of dress.

782. W. Rowett. Improvements in the construction of electric telegraph cables or ropes.

895. T. Greenshields. Improvements in purifying gas produced from coal and obtaining ammoniacal and other alkaline salts.

917. W. Jones. Improved machinery for ringing bells.
956. R. Johanny. Improvements in the construction of furnaces.
986. J. G. Appold. Improved apparatus for laying submarine telegraphic cables.
995. W. Ross. Improvements in taps or valves.
999. W. S. Hollands. Improvements in extracting and purifying oils and fatty matters.
1013. W. E. Newton. Improvements in the manufacture of saltpetre. A communication.
1025. A. Neilson. Improvements in the manufacture of boots, shoes, and other coverings for the feet.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

1126. Robert John Stainton and Edmund Charles Davey.
1127. Walter Henry Tucker.
1131. Paul Firmin Didot.
1139. Ignace Joseph Silbermann, jun.
1140. Antoine Fidelis Cossus.
1147. James Shanks.
1148. John Henry Johnson.
1153. George Collier.
1156. Joseph Morgan.
1157. Johan Jacob Meyer.
1161. David L. Davis.
1167. James Atkinson Longridge.
1170. James Park.
1185. Joseph Hippolyte Poullain.
1195. William Simson Young.
1199. Charles Weightman Harrison.
1224. Jean Baptiste Acklin.
1315. John Sutton Nettlefold, Edward John Nettlefold, and Joseph Henry Nettlefold.
1454. Auguste Edouard Loradoux Bellford.

LIST OF SEALED PATENTS.

Sealed May 21st, 1858.

2922. William Archibald Cooper.
2929. Samuel Riley.
2932. Charles Barlow.
2934. David Hulett.
2939. William Scarby.
2940. Charles Sands.
2944. Frederick Herbert Maberly.
2958. Samuel Barlow Wright and Henry Thomas Green.
2970. John Nicholls.
2976. Daniel Kinnear Clark.
2982. James Young.
3018. William Mercer, William Bodden, and William Higginson.
3032. George Holcroft and George Denholm.
3132. George Tomlinson Bousfield.
3160. George William Hart.
3176. John Thomas Griffiths.
3184. John Blake and Richard Dugdale Kay.
158. William Treleaven Fox.
260. George W. Burton.
362. James Henderson.
372. Augustus Applegath.
404. William Edward Newton.
478. Ferdinand Charles Warlich.
516. Alfred Vincent Newton.
560. Alfred Vincent Newton.

Sealed May 25th, 1858.

2954. Joseph Ruston and James Toyne Proctor.
2955. James Higham and George David Bellamy.
2961. Arthur Vandeleur.
2964. Antoine Alphonse Chassepot.
2971. Henry Deacon.
2975. Richard Archibald Brooman.
3001. Elijah Slack.
3005. James Buchanan.
3083. William Galloway and John Galloway.
3191. Alfred Vincent Newton.
183. Josiah Haste.
357. William Edward Newton.
548. William Ward.
605. William Edward Wiley.
655. William Armand Gilbee.
657. William Armand Gilbee.
675. Benjamin Wood.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Dates of Registration.		Nos. in the Register.	Proprietors' Names.	Addresses.	Subjects of Design.
April	22	4080	T. Parr	Torquay	Chimney Top.
	24	4081	J. Pierre	Durham	Corset Fastener.
	26	4082	Burt and Potts	Westminster	Windows and Frames.
May	1	4083	Ch. Weintraud, jun.	Offenbach, O.M.	Porte Monnaie.
	,,	4084	W. Spurrier	Birmingham	Cover for Jug.
	7	4085	Fossick and Hackworth	Stockton-on-Tees	Wagon Wheel.
	,,	4086	H. Lane	Wednesfield	Rabbit Trap.
	8	4087	J. Apperly	Stroudwater	Roller Blind Spring.
	18	4088	L. Stead	Norton-street	Chair Stool.
	19	4089	J. F. Meston	Mundford	Fruit & Blossom Protector.
	21	4090	N. M'Cann	Euston-road	Portmanteau.
	22	4091	T. G. Messenger	Loughborough	Pump.
	25	4092	J. Oxley	Camden Town	Bath.

PROVISIONAL REGISTRATIONS.

May	3	978	W. Northen	Vauxhall-walk	Drain Pipe.
	,,	979	J. Murphy	Poland-street	Spectacles.
	7	980	J. A. Clarke	Long Sutton	Riddle.
	14	981	Maynard & Burkitt	Southwark	Lantern.

May 19	982	J. S. Cook	Cross-street, Islington	Composing Stick.
20	983	J. Howland	Strand	Pipe.
22	984	A. Lowell	Balsall	Stop Hinge.
26	985	T. Leymann	Dean-street, Soho	Light Box.

NOTICESS TO CORRESPONDENTS.

We have so many letters deserving publication in hand that we shall be compelled to give almost the whole of our next week's issue up to correspondents. We hope then to find space for the communications of Mr. Atherton, Mr. Baddeley, "J. A. D.," Mr. Rawson, "Nauticus" (on Stability), Mr. Drake, "Observer," and a few others. It is likely that with our next volume we shall introduce changes that will afford us more space for articles and correspondence.

We have been compelled to withdraw our monthly article on the Iron Trade to make room for "B.'s" letter on the Atlantic Cable.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

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Mechanics' Magazine.

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Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London, E.C.

DUKE'S PATENT METHOD OF WORKING SHIPS' PUMPS.

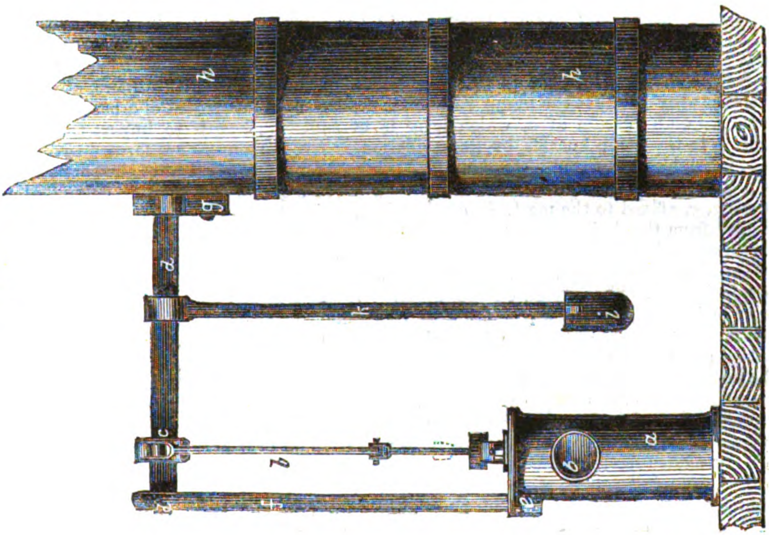


Fig. 2.

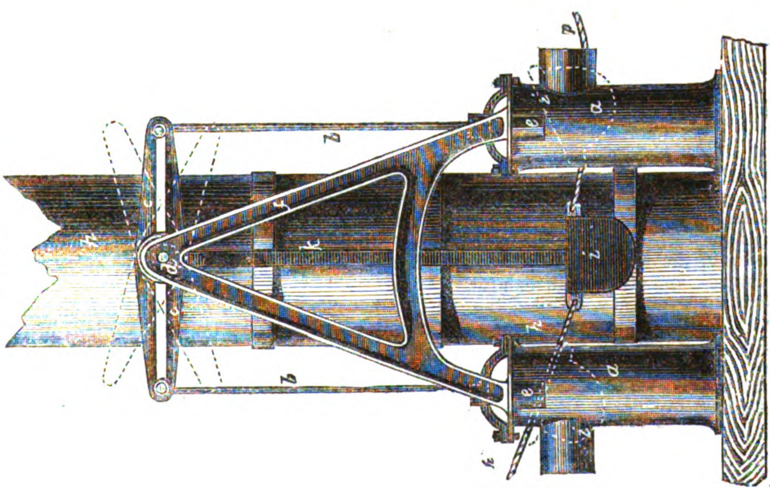


Fig. 1.

DUKE'S PATENT METHOD OF WORKING SHIPS' PUMPS.

Mr. R. Duke, shipbuilder, of Dover, has patented the application of an oscillating weight to the working parts of ships' pumps, whereby the manual labour required to work them is materially assisted. The pumps are mounted in pairs in the usual manner, and worked from a double arm or lever mounted on an oscillating shaft, the pump rods being attached one at either end of such lever. This shaft is mounted some feet from the deck, and from it is suspended a lever weighted at the bottom like a pendulum. Ropes are attached to this weight or lever, and an oscillating motion communicated thereto by "hands" alternately pulling in opposite directions; or it may be pulled and let go alternately in one direction only. The oscillatory motion of this weighted lever gives motion to the pump rods and buckets, and according to the extent of such oscillation so will be the stroke of the pumps, the weight being proportioned to the size of the pumps.

Fig. 1 of the engravings on the preceding page represents in elevation a pair of ships' pumps, mounted and worked according to the invention; Fig. 2 is a view of the same taken at right angles to Fig. 1. The pumps, *a*, *a*, together with their buckets and rods, *b*, *b*, are as usual, and act by means of a reciprocating motion as in ordinary, there being in fact no difference in the pumps themselves. They are disposed in pairs, at a suitable distance apart, so that the pump rods may depend from either end of a beam or lever, *c*, mounted on a fulcrum at *d*, which lever is of sufficient length to impart the requisite motion to the pump buckets by its oscillations. On the pumps are formed two sockets, *e*, *e*, in which is mounted a standard, *f*, *f*, which bears the one end of the shaft, *d*, *d*, on which the beam, *c*, is mounted and rocks. The other end of this shaft is supported in a bearing, *g*, affixed to the mast, *h*, of the ship; or another standard or stanchion may be erected from the deck for the purpose. On the shaft, *d*, is suspended an arm or rod, *k*, to the lower end of which is suspended a weight, *i*, which is of size and weight in proportion to the size of the pumps. For a pair of seven-inch pumps a body of about one hundred-weight is used. This weighted rod or lever is fixed rigidly on the shaft, *d*, as also the lever or beam, *c*, so that any motion of oscillation imparted to the weighted lever, *k*, is communicated to the beam, *c*, which alternately moves to the different positions shown dotted; this oscillating motion of the beam, *c*, imparts by direct communication therewith the up-and-down motion to the rods, *b*, *b*, of the pumps, and consequently to the buckets or plungers of the pumps, whereby the water is lifted and discharged as in ordinary pumps. In order to apply the power to work the pumps two ropes, *p*, *p*, are attached, one to either side of the weight, *i*, or it may be to some part of the lever, *k*, suitable eyes being provided for the purpose. These ropes are extended out in opposite directions, and several "hands" may be clapped on each. It will be readily understood, that to work the pumps the "hands" so applied have merely to pull and slack the ropes alternately. "The motion of the ship will," says Mr. Duke, "greatly facilitate the oscillations of the weighted lever, so that but comparatively small power is required to be applied to the pumps by hand in proportion to the amount of water discharged by the pumps."

FISHING TACKLE.

In the British Museum, in the Museum of the United Service Institution, and elsewhere, may be seen the veritable fish-hooks of the ancients. These are of iron, and are bent and barbed like the common fishing-hooks of the present day. The South-Sea Islanders, and others, although their hooks were made of bone, adapted the barb or guard to their hooks from times immemorial. It is curious to remark that the simple but effective contrivance of the barb was known to various nations wholly separated from each other, and it is one which cannot but be viewed as a most ingenious discovery which even the mechanical talent of the present age has been unable to improve upon. While everything else has been subject to change, the barb of the fish-hook has stood still. Was perfection here attained at once? If so, it is an exceptionable fact, not the less worthy, from its apparent insignificance, of being thus ranked.

The mackerel and other fish on our own coasts are caught with portions of themselves. Sir Edward Lytton Bulwer causes one of his heroes to take a perch with its own eye—no improbable story, as many an angler can vouch—and the natives of those shores where fish is the exclusive food of man, fashion the bone of one fish into hooks to secure the capture of others. But,

in each case, the barb of the hook must be hidden and covered by the bait to induce the fish to take the lure. Not so, however, with artificial flies. In the latter instance the hook itself is supposed to assist partly in the deception, as it represents the tail of the insect. But, inasmuch as this steel tail is either invariably black, or of a dark blue, it cannot possess an exact similitude to certain entymological classes in colour as it should do. We would, therefore, notice an improvement which has recently been made the subject of a patent by a Dr. Box, of East Love, in Cornwall, as a means of bringing the fly-fisher's craft yet nearer to perfection by the power to imitate yet more closely the natural object. This patent consists in electroplating fish-hooks, and it must be manifest that in doing so the colours and their shades may be obtained with considerable nicety by a deposit of gold (the yellows), silver, &c. (whites), and their alloys. We know, from experience, that the fly-fisherman attaches the greatest importance to the colours, and even the shades of colour of the wings of every artificial fly in his "book," and that certain spots upon certain places of certain birds of this and other lands are the only depositories from which the exact feathers, with their particular hues, can be obtained. But the colour of the body of the insect has been strangely overlooked. It is true the dubbing has been carried as near the barb as is possible, by some fly-makers, with a view of getting rid of the unsightly blackness of the exposed steel; but in doing this that portion of the hook appropriated to the holding of the fish has been trespassed upon, and the chances of its capture thereby diminished. This need not be the case, for instance, with an electroplated gold hook, the body of the fly being yellow. The hook, moreover, in such and similar instances may be left bare where the colour, being likewise that of the hook, is to be exhibited. These hooks, strange to say, have been "pooh pooh'd" a good deal by the trade, more particularly by that portion the shops of which are full of monstrosities intended to imitate gudgeon, dace, and other baits for the capture of trout and pike, but which have just as much effect in our more inland streams as a tobacco-pipe drawn rapidly through the water at the end of a clothes-line. The hook of Dr. Box is, moreover, furnished, when required, with a swivel close to the shank, which will be readily appreciated by those fishermen who delight to "spin" with the par's tail for salmon or trout. For this especial purpose, indeed, those with the long shanks, as used by the deep-sea fishermen of the coast of Cornwall, are admirably adapted. The Cornish fishermen see in those hooks many advantages over the old ones. They do not rust, and by their corrosion spoil the lines that they come into contact with, and the swivel permits of the turns and twists of the congar eel and other fish, expending themselves without the breakage of the hooks or the entanglement of the lines which is consequent upon their gyrations upon ordinary tackle. A few of these hooks were courteously sent to us when they first appeared, and we have used them ourselves as made into artificial flies, with, we are inclined to believe, considerable success, and those amongst whom we have dispersed them—anglers of great tact and discernment—speak in very favourable terms of them. If our readers should, however, desire to possess specimens of this hook we would save them the trouble of writing to the patentee, who is a distinguished medical practitioner, and of whose scientific leisure this patent is one of the results, by suggesting that they entrust the obtaining of such samples to Mr. Little, of Fetter-lane, one of the agents to the inventor.

It may not be irrelevant here to mention that our Royal Family are strongly imbued with a love for the healthful and delightful science of fly-fishing. H.R.H. Prince Albert is a salmon-fisher of no mean repute, and with the old Scotch keepers around Balmoral he stands in as much respect for the science he has imported into the sport in those parts as for his illustrious position. The Prince of Wales, Prince Arthur, and Prince Alfred, all exhibit a decided predilection for angling, and have each their rods and tackle made by Mr. Little; the Prince of Wales's being those exhibited at the Exhibition of 1851. These fly-rods possess a peculiar quality, which renders them almost equal to the Limerick rod, which, as is well known, is spliced into one piece, and is guiltless of ferrules. The ferrules in Mr. Little's patent are pierced and opened by leaf-shaped or vandyked pieces being cut out, and thus the play of the rod is not interrupted at those parts where otherwise the brass ferrules would check the uniformity of its elasticity. We may, likewise, add the Emperor of the French to the list of illustrious anglers. He has recently testified by an autograph letter, and a more solid inclosure, to the value of the rods made for him by Mr. Little, and especially designed for the capture of the real trout in the artificial rivers of Versailles.

THE IRON TRADE.*

FROM OUR OWN CORRESPONDENT AT WOLVERHAMPTON.

Present Condition of the Trade—Improved—The Shock—More Blast Furnaces Blowing—The American Trade—Increase of "Confidence"—Naylor, Vickers, and Co., Dennistoun and Co.—The Improvement General—Prices—Exports in 1856 *and* 1857.

THE condition of the iron trade, as compared with that of a month ago, is certainly improved, and it will go on improving as the time lengthens between the period at which there was the most depression. The progress will, however, be very slow, as it has been hitherto. That it should be slow is desirable, for then it is more likely to be permanent. The crawling pace at which matters are mending is indicative of the extent and severity of the disasters which we have just experienced. Veterans in the trade say, "It has been a terrible time—'25 was not equal to it." The depression is being now spoken of in the past tense happily, but great distress still prevails amongst the workpeople, and much struggling by not a few of the masters.

There are a few more blast furnaces blowing now than there were a month ago, and generally the malleable iron makers have somewhat more to do. At the same time, there are instances of standard houses not having so many orders on hand now as then.

The American trade has not revived, yet large orders for both the military and civil departments of the service have been given out on account of India.

One of the best features in the trade at the present juncture is the competency of the leading American houses. The realizable assets of those that were compelled to suspend will prove to be larger considerably than those resulting from the collapsing of British houses taken as a whole. The solvency of many of the Americans will tend to increase confidence at home in home firms sooner than would otherwise have been the case. Already Messrs. Naylor, Vickers, and Co., are ready to pay in full before their first instalment of 5*s.* becomes due; and Messrs. Denistoun are nearly in the same fortunate position.

The improvement to which we refer is not confined to one only of the iron making districts, but extends throughout south and north Staffordshire, the north of England, South and North Wales and Scotland. It must not, however, be regarded as of a decided character.

Whilst at the leading firms the prices of malleable iron are maintained, low rates are being taken in other directions. Pigs are low in South Staffordshire, but tend upwards in South Wales and Scotland.

Mr. Sanderson's paper on "Iron: its Commerce and Staple Manufactures," concludes with a series of elaborate tables, showing the precise quantity, in tons and money, which the several foreign countries have taken, and gives an excellent summary of the total exports of iron during the years 1856 and 1857, from which it appears that there was an increase, in 1857, of 174,604 tons, or 8¼ per cent. in weight, and of 2,156,605*l.*, or 10½ per cent. in money. The figures are:—

Description.	Exports. 1856.	Exports. 1857.	Declared Value. 1856.	Declared Value. 1857.
	Tons.	Tons.	£.	£.
Pig iron	357,326	423,215	1,385,118	1,611,467
Castings	72,394	72,780	712,177	754,619
Rails, bar, bolt, & rod	701,873	721,401	6,217,524	6,257,065
Plates, sheet, and sundry wrought iron	276,259	280,212	3,720,433	3,979,398
Steam engines	...	...	819,067	1,062,286
Sundry machinery	...	...	1,897,386	2,820,737
Hardware	34,738	39,250	3,747,598	4,016,327
Steel	21,858	22,321	735,823	748,381
Turned plates	...	...	1,407,906	1,500,992
Wire	9,190	11,433	195,034	213,399
Total in 12 months	...	...	20,838,066	22,994,671

The total exports in 1856 is equal in pigs to 2,086,728, and in 1857 to 2,261,332.

SURGICAL INSTRUMENT COMMITTEE.—The Council of the Society of Arts have appointed a Committee of highly influential gentlemen to investigate the subject of Mechanical Contrivances applied to Medicine and Surgery—to promote improvement in their production—to determine and make known desiderata—to examine and report on the merit of apparatus submitted; and to recommend rewards for successful invention.

* This article should have appeared in our last Number.

AUTOMATIC FIRE-EXTINGUISHERS.

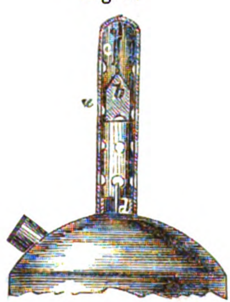
To the Editors of the Mechanics' Magazine.

Gentlemen,—Among the specifications of patents "not proceeded with," there is, at page 476, one by Messrs. Middleton and Lowes for "improved apparatus for the extinction of fires in buildings." This is one of the numerous instances of the precipitancy with which persons plunge into premature patents for patriarchal projects. The improvement which has occupied the united talents of these gentlemen has received much previous attention. In the year 1807, Mr. John Carey, D.C.L., of Islington, obtained Letters Patent for "an invention of various contrivances for preventing or checking fires," &c., in the specification of which the improved apparatus of Messrs. Middleton and Lowes is described with a fulness of detail which does not appear to have occurred to these gentlemen. In one of Dr. Carey's arrangements the apparatus was made self-acting. On the burning of a cord, a weight fell, and opened the cock, which set the water running. Various exigencies were skilfully provided for, but many serious objections exist to the use of such an apparatus, not the least of which is the difficulty of directing and confining the water to the exact spot where its services are required; while there are so many verses in the chapter of accidents, that it is very probable an extensive shower-bath might be discharged at a time and in a place where it was by no means wanted. A serious amount of damage would at all times be done by water; indeed, if the apparatus was effectual, the damage by water would often exceed the damage by fire. The arrangement of fire-cocks, hose and jet-pipes on various floors, supplied by an elevated reservoir of water, as proposed by Dr. Carey, has long since been used in many public buildings, manufactories, &c. The *Patent Fire-annihilator* seems well adapted for the purpose of an automatic fire-extinguisher in warehouses, shops, and other places left unattended after business hours. There are, no doubt, many ways in which the fire-annihilator can be made self-acting. Perhaps the following is as good as any:—Fig. 1 is an external representation of an automatic fire-annihilator; Fig. 2, an enlarged sectional view of the discharging apparatus. *a*, is a perforated upright metal cap or covering fitted on to the ordinary discharging nozzle; *b*, is a weight suspended by a thin metal plate cemented to a corresponding metal plate attached to the upper part of the perforated cap. A suitable cement for this purpose may be made of bees-wax and rosin, melting at about 100° to 120° Fahrenheit. So long as this apparatus is only

Fig. 1.

exposed to ordinary atmospheric temperatures, it would continue inert, but, on the outbreak of a fire in the apartment in which this apparatus was placed, the higher temperature attained at a very early stage of the incipient conflagration would soften the

Fig. 2.



cement, allow the weight to fall and strike the discharging pin, *d*, igniting the charge, and causing the evolution of the fire-destroying vapour. This would in most cases ensure the immediate extinction of the fire, especially if the power of the apparatus was duly proportioned to the size of the apartment. Deposited in suitable recesses in the holds of vessels (almost always inaccessible in case of fire), an automatic fire-annihilator appears calculated to be pre-eminently useful. The recent destruction by fire of the *James Baines* in the Liverpool dock, as well as a similar catastrophe in the Thames a few years back—the supply of water, as well as power for its appliance, being in both cases almost unlimited and in the most experienced hands—goes to show that the utter impossibility of directing the water upon the seat of the fire renders that mode of extinction wholly and entirely

powerless! The rapid discharge of an all-pervading, fire-destroying vapour in the earlier stages of such accidents seems to be the only hopeful remedy—with this important advantage, that whatever volume of gas may be so liberated, no damage to the cargo will be sustained.

I remain, Gentlemen,
Yours respectfully,
WM. BADDELEY.

13, Angel-terrace, Islington,
May 19, 1858.

THE ATLANTIC CABLE APPARATUS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I would not presume to make any remarks on the paper of the Astronomer Royal, "On the Laying of the Atlantic Cable," nor on the reply of Messrs. Longridge and Brooks, did I not think that the latter document was written under a misconception of the learned Professor's meaning.

All seem now of opinion that in a smooth sea, the ship moving at a uniform speed, and paying-out cable at the same or a slightly greater rate, the cable must form nearly a straight line from the surface to the bottom of the sea.

It is exceedingly gratifying to me that this theory has received the sanction of such eminent authorities, because when it was (I believe for the first time) brought forward by myself at the Dublin Meeting of the British Association it was received with great hesitation.

All seem to agree, also, that under the above conditions the tension on the cable, where it clears the ship, must be equal to the weight, in water, of a piece of the cable whose length is equal to the depth of the sea, *minus* the longitudinal component of the friction of the water. The difference of opinion seems to be as to the amount of this friction, and as the Astronomer Royal himself says, that there is in his estimation of it "uncertainty to such an extent as to affect in one case the practical conclusion," I cannot but think the reply to his paper more controversial than was necessary.

Undoubtedly the learned Professor must over-estimate the friction in the case of the Atlantic Cable, as was proved in practice; and it is to be hoped he will think the subject of sufficient importance to give the world, through your columns, a modification of his calculations of the diminution of tension caused by friction, not only for the Atlantic Cable, but for an imaginary one the same size and half the spe[cific] gravity.

In the table of strain (page 508) the o[nly] one affected to any extent by the ov[er] estimate of the friction is that when t[he] cable lies at the limiting angle—0.93 be[ing] in reality much nearer the mark than 0.[..] so much so, that at first I felt convin[ced] there must be a typographical error, a[nd] that I still think such may be t[he] case.

The rest of the table is beyond disput[e]. Messrs. Longridge and Brooks' objectio[ns] being based on a misconception of t[he] Astronomer Royal's meaning, expresse[d] however, most clearly. He says:—

"The speed of delivery being suppose[d] equal to the ship's speed, and the limiting angle being 26° 34′, 'if by inattention to the mechanism the delivery is impeded for a time,' until the angle becomes less, then the strain will be increased (as per table, page 508); and if again the delivery be made equal to the ship's speed, this increased tension will remain constant."

Messrs. Longridge and Brooks understand the table as meaning that a change of angle can take place—the speed of delivery remaining equal to the speed of the ship, and both remaining uniform; but no expression in the paper admits of this construction.

The Astronomer Royal is evidently not aware of the admirable arrangements of Mr. Bright for measuring the strain on the cable—arrangements which render an observation of the angle unnecessary, although, doubtless, that ingenious engineer will avail himself of the additional means of ensuring safety now pointed out.

In like manner, Messrs. Longridge and Brooks, in stating that the longitudinal friction of a cable paid out much more rapidly than the ship progresses "will be found not to exercise such an influence as to warrant us to look to it for relief against the great tension arising from a cable of great specific gravity," ignore the arrangements made to increase this longitudinal resistance, when necessary, by attaching suitable discs. The method of laying a heavy cable in water two miles and a-half deep, or a light cable in deeper water, with much slack, so as to relieve the tension, as pointed out by the Astronomer Royal, seems to me the only possible one. When I said so at the Dublin Meeting of the British Association, I was contradicted and laughed at; *but the Atlantic Telegraph Company is sending out 1,000 miles of slack*, and is going to use discs to distribute the tension, such as those for which I took provisional protection immediately after I had investigated

the question, but did not proceed to a patent, as such a patent could easily be evaded.

Seeing these views so soon corroborated, both theoretically and practically, I await patiently the acknowledgment of the truth of my logical deduction from these premises, viz., that a light cable is more easily laid and with less waste than a heavy one in water of moderate depth, and that *in very deep water none but a light cable can be laid* without an amount of waste not to be seriously contemplated.

I enclose you a piece of a cable invented and patented by Mr. John Macintosh, on whom I impressed these views, being myself unacquainted with the manipulation of gutta percha and such substances. You will perceive that the core is precisely that of the Atlantic cable, with the same amount of insulation; so there can be no demur on that head from that quarter. The longitudinal strength is obtained by imbedding fibres of flax, or hemp, or cotton in an outer layer of gutta-percha. This is done with great pressure between rollers. This covering is subsequently subjected to treatment which enables it to resist tropical heat, and affords quite sufficient protection from any blow or ill-treatment a telegraph cable can ever be subjected to. In shallow water, of course, we propose to cover all with strong iron wire. I shall feel much obliged to your correspondent, "B," if he will frankly state his objections, if any, to such a cable.

Apologising for the length at which the interest of the subject has made me enter into it,

I am, Gentlemen,
Your obedient servant,
T. A. Blakely.

To the Editors of the Mechanics' Magazine. *

Gentlemen,—Will you allow me to make one or two remarks in reply to your correspondent, "B.'s," letter of 24th May?

He does not attempt to prove that my first objection to the paying-out apparatus is unfounded, but he pronounces it *invalid*, because, he says, there are no changes in the depth so sudden as to produce the effect I mentioned. Now, even if this were so, my objection to the apparatus would not thereby be *invalidated*. All that "B." would have a right to affirm would be, that the defect in the apparatus would not manifest itself in the particular case of the Atlantic Cable. The assumed smoothness of the bottom of the Atlantic has nothing to do with my objection to the apparatus; and, therefore, I must again repeat that, as a paying-out apparatus, it is, in my opinion, defective.

I have just said the *assumed smoothness*, for, with all the acquired knowledge, including that derived from the soundings by the *Cyclops* last autumn, I do not think any one would be justified in asserting that sudden declivities and deep ravines do not exist, and, in this uncertainty as to their existence, the prudent course would be to provide against their effects. This provision ought, I repeat, to be made by a gradual increase of brake pressure under the control of the brakesman, and not by a tentative and *per saltem* process of adding a hundredweight, or even less, at a time.

My second objection, "B." says, "has arisen from imperfect information as to the appliances to be employed."

In reply, I beg to say that no appliances can destroy the laws of mechanics, or the properties of matter. Inertia must be a serious cause of difficulty and danger with a ponderous paying-out apparatus. I examined the present apparatus carefully, with special reference to this point, and I am bound to say that I dissent entirely from "B.'s" assertion, that "the power of compensating for any degree of unequal drag occasioned by the pitching of the ship is completely afforded in the machinery in question, if necessary."

With reference to the construction of the cable, your correspondent admits, as does every one else *now*, the desirability of getting the lightest and strongest cable, "*provided it does not infringe upon other conditions*" (electrical, I presume); but, he says, "no new form of cable has yet been designed and subjected to proof that fulfils the necessary requirements." *Designed and subjected to proof* are here coupled together, but I take leave to separate them. A cable has been designed, and I exhibited a portion of it during the discussion at the Institution of Civil Engineers, which, with much less absolute weight, possesses two-and-a-half times the strength of the Atlantic cable; that is to say, *if strength be measured, as it ought to be, by reference to the work to be performed.* It is idle to talk of the strength of a telegraph cable in the testing machine. The only true measure of its strength is the length of itself which it will support hanging vertically in water; and, measured by this rule, I will undertake to design a cable of double the conducting power and four times the strength of the present Atlantic cable. Again,—in reference to subjection to proof, let me remind "B." that the most successful cable ever laid, as regards the operation of laying, was the cable in the Black Sea, and it was far lighter than the Atlantic cable. It is true it eventually gave way, but that arose from causes which would not have operated had it been laid in 2,000 fathoms of water.

In shoal and stormy waters cables must be strongly protected. In deep waters, when once laid, they are safe; and, in the operation of laying them, the adoption of a heavy outside iron protection, is simply suicidal.

The fifty miles of cable recovered last autumn are found to be electrically unserviceable. What has injured it? The tension in taking it up. In like manner the necessary tension in laying a heavy cable in deep water will, in all probability, injure its electrical condition.

It would appear that an attempt is to be made to reduce this tension by running out the cable with a great deal of slack; at least, the enormous quantity of cable shipped leads to such an inference. Well, if they do succeed by such a device, extravagant and inefficient as it is, what will be the effect upon the speed of transmission of messages? How many words per minute will they transmit through 3,000 miles of submerged wire of the diameter of their present conductor?

I do not profess to speak with authority on this point, but I will venture to say, that if the Atlantic Company have to transmit their messages through

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* This letter from Mr. Longridge reached us after our Number was made up, but as its interest is immediate we have removed a shorter letter of Captain Shuldham's upon the same subject, and made space for it. We were the more anxious to do this as we hear, from another source, that Mr. Longridge's engagements will remove him from this country for some time. Captain Shuldham's letter we hope to give next week.—Eds. M. M.

the whole of the cable now on board the *Niagara* and the *Agamemnon*, their project will have little chance of being commercially successful.

One word in conclusion as to the conductor.

Your correspondent is in error in supposing that the cable I would prefer has an iron strand for its conductor. I believe a specimen was on the table of the Institution of Civil Engineers of a rope so made, but it was simply as an illustration of the principle of construction, viz., by putting all the metallic portion in the centre. For short distances iron conductors may do very well; for long distances, copper should be used; but the nature and diameter of the conductor, the thickness of insulator, and the outer covering, ought to be determined with reference to the peculiar circumstances—such as distance to be traversed, depth of water, exposure to storms, &c., which each individual case presents.

I am, Gentlemen, your obedient servant,

J. A. Longridge.

18, Abingdon-street, Westminster,
June 1, 1858.

STEAM-SHIP CAPABILITY.

To the Editors of the Mechanics' Magazine.

Gentlemen,—I am obliged by your having inserted my late communication, as it appears to have elicited remarks from "Nauticus" as a commercial shipowner, controlling the working operations of two ships, at least, in which he favours your readers with a few *l. s. d.* counting-house facts, pertinently bearing on the matter under consideration, *viz.*, the applicability of the formula $\frac{V^3 D^{\frac{2}{3}}}{I\ H\ P} = C$ to determining the mutual relations of displacement, power, and speed that may be expected to be realised by vessels to be built on a type of form of which the value of the coefficient (C) has been already practically ascertained. The statement of your correspondent, thus brought before the notice of your readers, appears to bear the following interpretation, *viz.*, that the ship A, though producing, by the formula referred to, the high index number (C) = 249, and, therefore, by my showing, a ship of extraordinary dynamic merit, was, nevertheless, an unprofitable ship, and therefore your mercantile correspondent somewhat indignantly exclaims, "It really is of no use to argue about C's with men who measure everything by *l. s. d.*" Perhaps, however, your correspondent, in deference to your insertion of his letter, may be disposed to give attention to a few remarks, in reply, which appear to have hitherto escaped his notice, as to the operation of various causes under which his good ship A may have been an unprofitable ship. For example, to begin with, a ship of admirable dynamic merit may be under slovenly or lubberly command, in consequence whereof the senses of any man who sets foot on board may be offended by what he sees, hears, and smells; the ship thus becomes of bad repute; and a ship that does not attract either passengers or goods cannot be expected to be remunerative. But I will not suppose that a shipowner, who prides himself on being "Nauticus," would condemn a good ship merely for the faults of an unfit commander; he would not employ such a man on a second voyage, so let us see what other rock a good ship, such as A, may be thrown upon. I may observe, then, in the second place, that the good 12-knot steamer, A, may be working in competition with other packets in great measure dependant on passengers (say, colonial passengers and emigrants), who generally, for long voyages, prefer what they suppose to be a large ship, and make their selection of a ship perhaps weeks before. They start from home, being influenced in their choice by the advertisements which almost exclusively occupy the first page in the *Times* newspaper. The possible consequence of this is, that your correspondent's ship A, having been advertised in accordance with her legal tonnage, as registered and set forth in the "Mercantile Navy List,"—that is the register tonnage, may have been regarded as a very small ship, in comparison with other ships, X, Y, and Z, which may have been advertised at double the tonnage of A; the fact being that A may in reality be the biggest ship of the lot, for the advertised tonnage of X, Y, and Z may have been *the builder's* tonnage, O. M., which frequently measures more than double the register tonnage. Thus the ship A is jilted of her passengers, and does not pay. There has been a vast deal of merchant shipping legislation of late years, in which gnats have been strained at, camels swallowed, and tubs thrown to the whale with marvellous effects. But, however fair and honest it may have been towards others on the part of your corresponding shipowner, "Nauticus," thus to have advertised his ship by her register tonnage—the only denomination of tonnage now recognised by the present law of shipping admeasurement—he may perhaps take it personally as a great commercial reproach that the failure of his ship A should be thus attributed to such unsophisticated management; so, as I never mean to give offence in such discussions, we will suppose that the ship A has been well officered, well touted, and advertised, as in many cases, at nearly three times her register tonnage and, moreover, that she gets as many passengers and goods as she can carry, and yet does not pay, let us now look again into the matter to see how this can be. Well,

then, it may so happen that the trade has increased on the station on which the ship A has been employed; that rivalry has sprung up, and the rates for passengers and goods gone down; moreover, A's boilers may probably have got a little the worse for wear, and the time in which the ship really does perform her passage may be now noted to the minute, and invidiously compared with that of the rival ships; hence the quantity of fuel required for the voyage becomes increased, and the weight of paying cargo proportionally reduced; the expenses are thus increased, and the earnings less. The good ship A is found wanting by the inenviable ledger test, *l. s. d.* She is manifestly now unfit for the service assigned to her, and "Nauticus" now discovers that the ship is too small, for, after being loaded with the coals necessary for performing the voyage at the average 12-knots' speed, there is but little or nothing left to pay. "Nauticus" now decides that A must be superseded by a ship of greater size, B.

The question now arises what must be the increased size of the new ship, and what must be the engine-power to attain the speed of 12-knots per hour? In this emergency "Nauticus" refers to the pages of the *Mechanics' Magazine*, wherein he finds that the nominal tonnage of a ship, whether register or builder's tonnage, affords no certain indication whatever as to the tons' weight of coals and cargo that the ship will carry, and that the nominal power of engines affords no indication whatever of the working powers, or of the coals that will be consumed; and finding reference made to Atherton's *Steam-ship Capability*, 2d Edition, he sceptically takes it up also, and beginning with the last page of the book, Appendix No. 4, page 3, to see what it is all about, it fortunately happens that ship A and ship B, in capital letters, strike his commercial eye, attract his attention, and he then finds that the profitable employment of a ship depends essentially on the capability of the ship for running at the required speed, carrying her coals, and having displacement to spare, being judiciously adapted to the requirements of the service to be performed; for, "*if common sense be appealed to, its dictation is this*," that a ship so large as to be inadequately loaded with paying freight, or a ship so small as to carry nothing but its own coals, certainly will not be remunerative. But, the 2nd Edition of the Essay above referred to being now, I believe, exhausted and out of print, I beg to lay before your readers the following extract therefrom:—"Commercial rivalry will, undoubtedly, render a correct appreciation of the dynamic qualities of ships and the judicious adaptation of ships to the service required of them essential elements of directorial administration, without which no steam-ship enterprise can be successfully prosecuted unless circumstanced or subsidised to the exclusion of equal competition."

What course does "Nauticus" now take after getting these hints and studying their demonstration? Why, he at once enters into calculations which are no longer based on tonnage and nominal H P, but on displacement and indicated H P, with a view to superseding ship A of 1,728 tons' displacement and 1,000 I H P by a ship B of 2,415 tons' displacement, to be built on the same type of form as A, having an index number of dynamic efficiency (C) = 249; and by means of the formula $\text{I H P} = \dfrac{V^3 D^{\frac{2}{3}}}{249}$ he finds that his proposed new ship of 2,415 tons' displacement will require only 1,250 I H P to attain the desired speed of 12 knots per hour. He also sees that, inasmuch as the displacement will be increased in the proportion of nearly $1\frac{1}{2}$ to 1, while the I H P, and, consequently, the weight of coals required for the voyage, will be increased only in the proportion of $1\frac{1}{4}$ to 1, the capability of the new ship B for carrying paying cargo will be greatly increased over what was the case with ship A. "Nauticus" therefore builds his new ship B; he puts her upon her test trial, and, finding that she works up to the stipulated index number of dynamic duty C = 249, he pays the stipulated contract price, puts the ship to work on the station where the smaller ship A failed, and she succeeds, for "in the counting-house they say that the steamer B pays, and A loses," which publicly beneficial result he communicates to the Editors of the *Mechanics' Magazine*.

I am glad to see that "Nauticus" raises no objection about the cube of the speed (V^3) being made a function of the formula; he only boggles at the cube root of the square of the displacement ($D^{\frac{2}{3}}$). But, as he probably admits the formula in its ordinary form of expression, $\dfrac{V^3 \times \text{Mid. Sec.}}{\text{I H P}} = C'$, I can only say in justification of my adopting what I conceive to be the more comprehensive and useful formula $\dfrac{V^3 D^{\frac{2}{3}}}{\text{I H P}} = C$, that, by the law of nature, the ratio of the midship section of *similar* bodies is also expressed by the ratio of the cube root of the square of their cubical contents.

Now, on what ground it is that "Nauti-

cus" condemns the formula, by adopting which he has himself, on his own showing, so well succeeded in getting himself out of a mercantile dilemma, I must leave your readers to judge of. Perhaps they may be of opinion that some pursuits, to be successfully prosecuted, require, not only "common sense," but also the acquirement and application of some degree of uncommon sense, and that "steam-ship capability" is one of them.

I am, Gentlemen,
Your very obedient servant,
CHAS. ATHERTON.

Royal Dockyard, Woolwich,
May 24, 1858.

P.S. With reference to "C. D.'s" communication in your last week's Number (1816, page 518), commencing, "Mr. Atherton is indeed indefatigable in recommending the use of his formula as a test of the economy of steam-vessels," I beg to state that I have never written a sentence which implies such a construction. What I have stated is to this purport—that, provided a ship is to be built of a type of form proportionally similar to a vessel of which the coefficient, C, has been already determined, and if the two vessels be in all respects similarly circumstanced as respects condition of hull and ratio of indicated to effective power of the engines, then, by applying this known coefficient to the intended vessel, the formula referred to will express approximately the mutual relation of displacement, power, and speed that may be expected to be realized; whereby, if any two of these elements be assumed, the other may be found, thus giving mercantile shipowners the power of procuring ships adapted to the special service that may be required; for, unless the special requirements of the service be attended to, and judiciously met, my ideas of common sense tell me the ship will not pay; for what signifies "the number of tons capable of being carried by one-horse power a conceded distance" if the ship be too large for the requirements of the service, and, therefore, not half filled; or, if the speed be too slow for the required service, or greater than required, thereby involving unnecessary expense. The formula may be in the hands of the Steamship Director just what the quadrant, the almanac, and the chart are in the hands of the navigator. The judicious use of the one may save the enterprise from being wrecked in the counting-house, as the judicious use of the other may save the ship from being wrecked at sea. C. A.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—"C. D." notices my objections to Mr. Atherton's formula, and refers to those of one of your correspondents which were published last year.

I made the formula produce *like* coefficients from *unlike* ships: this I deemed fatal to its validity. Your last year's correspondent made it produce *unlike* coefficients from *unlike* ships: this, one would think, is hardly so fatal. But I suspect insidiousness on the part of "C. D.," or why does he direct our attention to a period when the said correspondent received a severe castigation at your hands? And why does he refrain from eulogizing the brilliant discovery then made by him respecting steam-ships transcending the laws of nature, as *well as those* of mechanics and hydrostatics, which he, of course, regarded as mere appendages to those laws? I had forgotten all this. The small type had slipped from my memory, and your merciless satire had passed away with it. Why did "C. D." refer me to the No. containing all this? He must owe his pretended *protégé* a grudge. NAUTICUS.

THE STABILITY OF FLOATING BODIES.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—With respect to the remark which I ventured to make and illustrate in my communication on the stability of floating bodies, dated April 28, 1858, I beg to state that it was made under the impression that absolute maximum and minimum of the distances between the centres of gravity and buoyancy, in the case of unstable and stable equilibrium of a floating body, were the subject of discussion. But I find this is not now the idea involved in the inquiry; hence my remark falls, I trust, harmlessly to the ground, as there was no intention on my part to provoke the slightest irritation on a subject so purely philosophical, and also so purely open to receive the consideration of every individual, however humble his position, as is the subject of stability of floating bodies. I shall not stop to inquire whether the letters of your talented correspondents "W" and "A Mechanic" can be legitimately interpreted so as to give to a careful reader a different impression from that which was conveyed to my mind, because I conceive no useful end can be attained by such a procedure; still, I must express my conviction that, after reading the letters over several times, I can only arrive at the same conclusion as before, viz., that, in the case

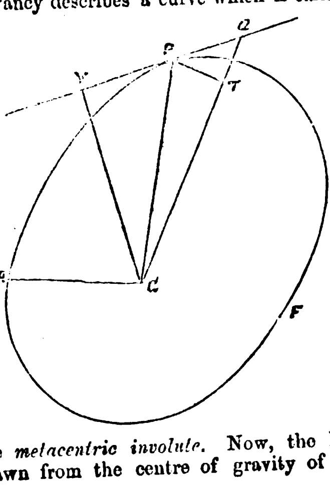
of stable equilibrium, the distance between the centres of gravity and buoyancy is less than in the case of unstable equilibrium. But, however, the prism I have selected completely sets this question at rest in the negative.

Allow me to state to your talented correspondent "A Mechanic" that I had no intention whatever to imply that he was not able to grapple with the difficulties of the question: all I wished to state was, that I could not comprehend the whole of his reasoning on the matter. "A Mechanic" will find, if he further examines my prism, that the whole of the positions of equilibrium are not six, as stated by him, but ten; and if it be true that the positions of equilibrium are alternately stable and unstable, then I conceive that G P_3 is not necessarily a maximum, as there is another position of equilibrium between G P_2 and G P_3 not noticed by him. When the prism alluded to floats with one edge at the base immersed, so that the water-line cuts the base at a distance (x) from the angle immersed; then it can be readily shown that the values of x determined from the equation

$$x^4 - 36x^3 + 4752x - 9216 = 0$$

will give the positions of the water-line at which equilibrium obtains. Of course, negative values of x, and values greater than 24 are inadmissible. The four values of x are, respectively, between 1 and 2; 13 and 14; 31 and 32; and -10 and -11. The two first roots give the positions of the water-line in the cases of equilibrium.

The question now is, I apprehend, as follows,—during the successive inclinations of a floating body from a fixed position through any given angle, the centre of buoyancy describes a curve which is called



the *metacentric involute*. Now, the line drawn from the centre of gravity of the floating body to the successive points of this curve varies in length, and the proposition affirms that the positions of maxima and minima of this line correspond with the positions of equilibrium of the floating body.

The following is offered as a demonstration of this proposition:—

Let A P F be a given curve, A and G being fixed points. Draw G Y perpendicular to P Y, a tangent to the curve at P; then draw Q G making the angle P G Q $= d\,\theta$, when A G P $= \theta$; and let fall P T perpendicular to G Q. Put P G $= r$, and G Y $= p$. Then, Q T $= d\,r$, because G T is ultimately equal to P G.

If $r = f(\theta)$ be the polar equation to the curve A P F, then it is well known that the maxima and minima positions of r will be determined from the equation

$$\frac{d\,r}{d\,\theta} = 0 \quad . \quad . \quad . \quad (1).$$

The triangles P Q T and G Y P are ultimately similar.

$$\text{Then,} \quad \frac{QT}{PT} = \frac{PY}{GY}$$

$$\text{Or,} \quad \frac{d\,r}{r\,d\,\theta} = \frac{\sqrt{r^2 - p^2}}{p}$$

$$\text{Then,} \quad \frac{d\,r}{d\,\theta} = \frac{r\sqrt{r^2 - p^2}}{p} = 0,$$ from equation (1).

This equation is satisfied if $\sqrt{r^2 - p^2} = 0$, or $r = p$. Hence, the points in the curve, which correspond to the values of r being a max. and min., are those in which the quantity P Y $= \sqrt{r^2 - p^2} = 0$, or, which is the same thing, the radius vector P G $= r$ is perpendicular to the tangent P Y.

To apply this property to the demonstration of the proposition in question, it is only necessary to conceive the point G to be the centre of gravity of the floating body and the curve A P F to be its *metacentric involute*.

Now, it is a well-known property (see Fincham's "Outline of Shipbuilding," p. 156, Art. 223) that the line G P is perpendicular to the tangent at P when P corresponds to a position of equilibrium. Therefore, all points in the metacentric involute that correspond to the position of equilibrium are the points which determine the radius vector G P to be a max. and min.

I hope this demonstration of an interesting property will be deemed satisfactory.

"A Mechanic" has introduced another problem to my attention, the solution of which may be facilitated by asking another question—What are the forces in amount

and direction that act on a floating body when deflected from its position of equilibrium? If "A Mechanic" will undertake to supply this data, then I may venture to give a solution to the question, "How does a body move when deflected from its position of equilibrium?"

It is well known that when a floating body is deflected its centre of gravity generally moves horizontally as well as vertically, but I cannot perceive what advantage is gained in the important question of stability by a consideration of the horizontal motion.

I am yours very faithfully,

ROBT. RAWSON.

Portsmouth, May 22, 1858.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—The highly interesting letter of "A Mechanic" (in the No. for May 15) has to be dealt with by Mr. Rawson. But, as I am referred to in it, and as my meaning appears to have been overlooked, I am desirous of offering a few words of explanation.

At page 441 I stated:—

"For, when the body is deflected through a small angle from instable equilibrium, the *metacentre*, during the indefinitely small space of time required, is the axis of rotation, and the centre of gravity describes an arc of a circle of which the *metacentre* is the centre. The form of the immersed portion of most bodies continually changes as the body is deflected; its centre of buoyancy consequently has a continually shifting position, the *metacentre* is correspondingly affected; but at any instant, and at every instant, the *metacentre* is the neutral point round which motion takes place."

"A Mechanic," after repudiating the common error of assuming that the centre of gravity rises and falls in a vertical line during the transition from instable to stable equilibrium, goes on to say,—"'Nauticus' has by no means hit the mark when he says that motion takes place about the *metacentre as a fixed point*, as the centre of gravity will generally have a motion in a vertical direction, which is inconsistent with his idea."

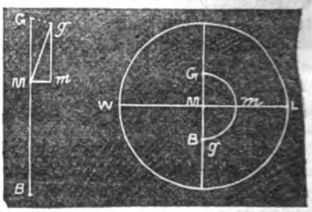
It is the very essence of instable equilibrium that the centre of gravity should be above the *metacentre*, and that the centre of buoyancy, metacentre, and centre of gravity, should be in the same vertical line. Thus the system would remain. But if any extraneous deflecting force act upon it, rotatory motion of a complicated character generally results. Let G M B be the vertical line; G, the centre of gravity; M, the *metacentre;* and B, the centre of buoyancy. The *tendency* of the point, G, is to move in the arc, G *g*. Being *out of* the vertical line, it acquires moment which is measurable by the horizontal distance, M*m*. But as it would have no moment if not *out* of the vertical line, it appears to me that the impossibility of its descending to a stable position *in* the vertical line is obvious.

With regard to myself, I do not wish for a moment to impute to "A Mechanic" that he has wilfully misrepresented me; still, I think his remarks, as quoted, contain a strange misrepresentation. I never regarded the metacentre *as a fixed point* (the term would be a sad misnomer, if it were), except in the case of a cylinder; but in all bodies which, when deflected, have their immersed portion changed in form, I distinctly recognised and referred to the consequent change of the position of the metacentre. Still, at *every instant*, the metacentre *of that instant* is the point round which the centre of gravity revolves.

Now, the descent or ascent of the centre of gravity,—that is, with relation to the metacentre (for, in instability it is *above* it, and in stability *below* it) is quite consistent with this conception: for, surely, it does not require that the centre of gravity should fall *through* the metacentre in order to get below it; which, indeed, we have seen is impossible.

In the case of the cylinder, of which fig. 2 is a section,—its specific gravity

Fig. 1. Fig. 2.

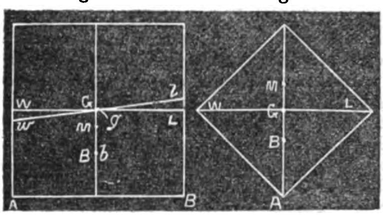


being half that of water, W L is the plane of flotation. Now, supposing the cylinder not to be homogeneous, but to have its centre of gravity at G; then, it seems plain that M would be unchanging, and that if G be deflected in the direction G *m*, it will persist in moving in the arc G *m g*, have its greatest moment at *m*, and arrive at a stable position in *g*. This confirms the accuracy of my conception, and shows that the lowering of the centre of gravity is quite consistent with it.

In fig. 3, which is a section of a square prism, the centre of gravity, it may be said, *attempts* to do the same thing, but is prevented from doing so by the varying form of the immersed portion, and the resulting changes in the position of the *metacentre*,

This prism is, also, of half the specific gravity of water. G, its centre of gravity, M, its metacentre, and, B, its centre of buoyancy. This is, then, a position of instable equilibrium, because G is above M. This will be seen more clearly by assuming dimensions. Say, side of square = 12. Then, L G = 6, and $\frac{2}{3} \times \frac{6^3}{72} = 2$ distance M B. M G, therefore, = 1. Now, if this body be deflected, the *tendency* of its centre of gravity will be to move in the arc G *g*, of which M is the centre. But this is counteracted by an instant change in the form of the immersed body. W L becomes w l. B moves in the direction b, and a perpendicular raised from *b* crosses the axis at a point away from M. This point is the new metacentre, and the centre of gravity has, at the moment, a tendency to revolve round it. This process goes on till the body arrives at a position of stable equilibrium, as shown by Fig. 4. Here the

Fig. 3. Fig. 4.



water-line W L is $\sqrt{(12^2 + 12^2)} = 16.97$. G is centre of gravity. L G $= \frac{16.97}{2} =$ 8.485. $\frac{8.485}{3} = 2.83 =$ distance from B to G. And $\frac{2}{3} \times \frac{8.485^3}{72} = 5.66$. distance of M from B. Here, then, is considerable stability.

Now, from the time that the body was slightly deflected from the position, Fig. 3, till it arrives at the position, Fig. 4, the motion is SPONTANEOUS, and seems to arise from the centre of gravity not being supported. That centre seems to have a minimum of moment at first, passes afterwards through a maximum, and ultimately arrives at a minimum again. This appears to be reconcilable only with a variation in its horizontal distance from the centre round which it moves. That centre is not a fixed, but an incessantly changing point. Still no such motion could take place if the metacentre, centre of buoyancy, and centre of gravity, were all in the same vertical line. The centre of gravity is in the water-line, Fig. 3, and it is also in the water-line of Fig. 4.

I respectfully offer the above considerations to your mathematical correspondent, "A Mechanic," and my object will be attained if he or any other reader of your admirably conducted Magazine can turn them to a useful account.

I am, Gentlemen,
Your obedient servant,
NAUTICUS.

FRENCH PIGMENTS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Perhaps some of your readers may be able to afford information respecting a process said to be extensively adopted at the Arsenal of Brest and elsewhere in France, which consists in the employment of certain salts of zinc, together with the oxide of the same metal, and a substance designated as a *retarding agent*, as a vehicle or medium for pigments. The "retarding agent" appears to be borax or the carbonate of soda, one of which substances is added to the zinc salt in solution previously to its being mixed with the oxide. The salts mentioned are the chloride and the sulphate of zinc. The proportion of the salt and the oxide, which in practice is said to be most successful, is that of their chemical equivalents, *e.g.*, Zn O, S O_3, 7 H O.=136.5 to Zn O.=40.5. The proportion of the "retarding agent" I have not well ascertained.

At first sight, the process would appear to be chemically absurd, for no insoluble *basic* salt of zinc is commonly known, and the effect of the "retarding agent," carbonate of soda, would be to decompose the zinc salt.

Nevertheless, although the experiments I have made have not tended to the elucidation of the subject, I am unwilling to relinquish it without further inquiry, having received positive information from reliable authority that the employment of ordinary vehicles for paint has been superseded by the process which I have imperfectly described, and, perhaps, imperfectly understood. The value of such a process, should its efficacy be proved, need not be insisted upon; oil paint would be replaced by a permanent and preservative colouring material at a fraction of its cost.

With regard to oil-paints, some experiments were recently tried by Mr. J. Ewer, of Williamsburg, U.S., to test their relative durability, and to ascertain the best method of applying them to surfaces exposed to the weather. The pigments employed were

white lead and white zinc; the vehicles, raw and boiled linseed oil, *patent dryer*, and turpentine. The latter substance was found to diminish the greasy character of raw linseed oil, but also to cause *chalkiness*. Of eleven experiments, that with white lead and *boiled* linseed oil—two coats applied *vertically*, instead of right and left—was the most successful.

DESMOND G. FITZGERALD.

27, Upper Berkely-street, Portman-square.

IRON DEFENCES.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—The necessity of rendering our coast fortifications shot-proof is daily gaining ground, and the Government *now* seem inclined to see how far iron will effect the object. It is now nearly thirty years, as my previous communications show, since my attention was first called to the subject, commencing with *vertical* plates, and ending in placing them at an angle of 45° and less, for glancing or throwing the shot off the direct line of fire; it appearing to me from my personal experience of the effect of shot, an elastic or yielding bed only could effectually stop point-blank shot fired within a range admitting of no deflection; or, in other words, shot fired from a distance which will produce the greatest effect on striking the object fired at.

This, in truth, is the point sought by the late practice with *wrought-iron* shot fired at wrought-iron plates of 9 ins. in thickness, placed perpendicular to the line of fire; and, although cast-iron shot and shell of the same weight might have been resisted or broken on striking the plate, the defence was imperfect, as it yielded to the wrought-iron projectile.

Such projectiles may be expensive, as to cost in making, but not so as it respects the results. And, now we have discovered what wrought-iron shot will do, we have to try in which way we can strip them of their destructive power, and bring them back in effect to the less expensive shot of the service—cast iron; and this, as I have before observed, may be accomplished by earth-work or other yielding substances, or by diverting or glancing them on the principle on which I subsequently constructed my numerous fortifications for coast and harbour defence; my object being that of rendering the defence more formidable than the attack.

Fortifications faced with *large* blocks of stone, well clamped together with iron, will, doubtless, stand the effect of wrought-iron shot perhaps quite as well as shot made of cast iron; and, but for the splintering or yielding of stone to iron, fortifications thus constructed would be impregnable. We have in numerous instances, even within my recollection, demolished the strongest fortifications of stone by continuous and concentrated fire; therefore we know how to deal with forts which, were the material as hard as iron, it would have been useless to attack; and it was with the knowledge of this fact I first gave my attention to the rendering of batteries impregnable by facing the works with iron; and when I found the War Department, about two years since, trying the effect of shot on 4 ins. plates, I felt it to be my duty to request their being placed at the angle proposed for glancing, which was refused, and my suggestion treated as though I had committed a crime to the State in recommending that which a costly and protracted experience dictated.

'Tis hard, Gentlemen, to deal with a Government but little inclined to adopt inventions on their merits, and harder still for an inventor to see his inventions shelved and brought out before him in the name of some fortunate *protégé* of the Government; and your correspondents who have lately addressed you on this "*delicate question*" may well caution inventors how they submit unprotected inventions to such a Government. But let us hope the threatened danger to which we have been lately exposed, and which will be again repeated on the slightest provocation, has roused England's Government to a clear sense of justice, and that those blighting practices which have kept England from being so long properly defended will be uprooted by a strong sense of public duty on the part of those whom it may please Her Majesty to place over the Admiralty and Ordnance Departments of the country.

Knowing now what *cannot* be effected by the use of iron, it remains to be discovered *what can;* and, if the Government will construct the face of a battery with cast and wrought iron conjointly (such as I have numerous examples to select from), a very short period from this date will demonstrate this highly-important national question, at a cost not amounting to an objection.

Much of the work may be done with cast iron at an expense much below many of our forts which have been built since I designed them; and I trust that I shall not be looked upon as guilty of treason if I humbly request the War Department to try the wrought-iron plates placed at the angle of 40° to the line of fire, and see what effect both wrought and cast-iron projectiles will produce upon them. My belief is, the

plates will remain comparatively uninjured; and if so, the Government will perceive that the future safety of the country against invasion commands them to begin *de novo* with our coast fortifications; and I can only assure them all the injustice of which I have so long complained to no purpose shall, so far as it possibly can, be forgotten, for neither time nor money wasted in my endeavour to serve my country has destroyed that desire which I was early trained to respect by those who knew and felt it to be an unpardonable offence to refuse to serve the State in time of need.

I remain, Gentlemen,

JOHN POAD DRAKE.

May 22, 1858.

WHITWORTH'S POLYGONAL RIFLE CANNON.

GENTLEMEN,—In your Number for Saturday last, 1815, you give a brief report of the fate of Mr. Whitworth's cast-iron cannon, which, "*at the fourth round, burst into fragments.*"

This is another proof in the right road to ascertain what sort of rifling is required for *iron* projectiles, and it would appear the polygonal is not more successful than the oval principle.

The gun is stated to be a cast-iron 32-pounder, of the usual length and weight, namely, 10 feet 6 inches long, and 56 cwt.; and, I presume, from the length of Mr. Whitworth's *shot*, 3 diameters, giving about 4 instead of a 6-inch calibre; consequently the thickness of the gun, in proportion, is greater than that of Mr. Lancaster's first examples, which I personally inspected at the Proof Department, Woolwich, and at once pronounced the principle to be imperfect in rotation; and the moment I saw a description of Mr. Whitworth's gun I considered its fate would be one and the same, from imperfect rotation.

To make a projectile for a rifle cannon of unyielding substance, such as cast and wrought iron, if rotation is not perfect, and the projectile be hollow and made of cast iron, it must crush or burst the gun; and practice proved these facts clearly in the Lancaster cannon by the crushing of the cast-iron hollow projectile, and by the bursting of the gun in the chase by the unyielding wrought-iron projectile subsequently adopted. And although I pronounced, *before practice*, what has since taken place, I am by no means inclined to find fault with the Government for placing the results before the world in such a form as to leave the path open for more successful inventions. And I believe I can speak with confidence when I say that I have seen plans of projectiles for rifle cannon which the War Department, acting under the influence of a "Select Committee" Report, have refused to try even at the very moment the late war demanded that no expense should be spared in the perfecting of rifle cannon.

I have no personal knowledge of Mr. Whitworth or Mr. Lancaster, and have but one object in view in noticing their cannon, and that, I hope, will be found identical with the interest of the public service.

Mr. Lancaster was brought under the notice of the War Department by powerful influence; and, I am also told, Mr. Whitworth was strongly patronized by the Government; and so far, probably, we are indebted for the facts which experiment has given us relative to rifling cannon on the polygonal and oval principles; but it is to be hoped that failure will be attended with more extensive patronage till this important question be set at rest by *complete success.*

There are those who will be weak enough to advise the Government not to extend ordnance experiments farther, seeing that favourably-patronized inventions have not produced results commensurate with the expense incurred in their estimation.

In my opinion, Gentlemen, if we take into consideration the national importance of such experiments, the expense is not worth naming, although it has not been so judiciously incurred as it might have been. Better that science should be encouraged in the shape of favour *than not at all;* and although I am quite ready to admit that the War Department has not acted justly towards inventors, and that favour has had more to do with late experiments than it should, I strongly urge the necessity of experiment, and sincerely hope glaring abuses of patronage will not be repeated.

We are in want of improved cannon for national defence, and both in and out of Her Majesty's service this fact is fully admitted, and due encouragement in the end will prove due economy.

I remain, Gentlemen,

OBSERVER.

May 24, 1858.

CAPTAIN NORTON'S INVENTIONS.—Our old and respected correspondent, Captain Norton, read a very entertaining paper descriptive of his military inventions at the United Service Institution, on the evening of May 17th; Sir T. Herbert, K.C.B., in the chair.

MUSIC BY ELECTRICITY.

Gentlemen,—The managers of the Crystal Palace manifestly have the means of drawing large congregations to hear organ and other music, and it appears pretty evident that the employment of numerous organs or pianofortes in concert will soon become, if it be not already, a necessity. Now, to secure perfectly simultaneous execution from several performers is certainly not possible; and, therefore, means must be devised for operating the whole of the instruments by one performer. This may, I believe, be readily and satisfactorily effected by the aid of electricity. The motion which it is necessary to give to the keys of such instruments is one which, above all others, is most easily obtained by the mere making and breaking of an electric circuit; and I know of no practical obstacle to the carrying out of my suggestion. The presence even of the one performer at Sydenham would not be necessary, since, if suitable wires were laid down, he might execute the most complicated movements with as much facility from London as if he were on the spot. I believe all the finer effects of touch might be perfectly produced under the suggested arrangement. Of course, the system might readily be expanded, so that a single artist in town might delight audiences in all the principal towns of England simultaneously. Those who know nothing of electricity may be disposed to receive this suggestion with ridicule, but those who understand it will not be liable to fall into so vulgar an error.

Yours, &c., A. B.

ROAD PAVING.

Gentlemen,—Allow me to propose to town surveyors, having steep inclines in their streets, that they should try alternate rows of stones with alternate strips of wood. I think that the result would be favourable, inasmuch as the unequal wearing of the cross rows would leave good foot-hold for horses.

Yours, faithfully,

J. Simon Holland.

Woolwich.

SHEFFIELD GAS-HOLDER.

Gentlemen,—In reply to the inquiries of your correspondent, "J. J. M.," I beg to inform you that the Sheffield Gas Consumers' Company, and the gas-holder he refers to, have both ceased to exist. The gas-holder was erected in 1854, and in 1856 it was broken up and sold as old iron.

Yours, respectfully,

Edwin Unwin.

Sheffield United Gas Light Company,
19, Shude-hill, May 26, 1858.

Submarine Telegraphs.—We desire to direct the attention of our readers to a very interesting and judicious paper on submarine telegraphs which appeared in the last number of the *New Quarterly Review* (for May). We hoped to find room this week for an extract from it, but this, from the extent of our correspondence, we are unable to do. The writer very ably advocates the use of light ropes, repudiates the adoption of telegraph lines which would be subject unnecessarily to foreign control, and renders a discriminating tribute of admiration to the Atlantic Telegraph Company, which is all the more valuable as it is manifestly disinterested. We recommend our readers, who take an interest in submarine telegraphs, to obtain the article.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Hill, P., and J. Moore. *Certain improvements in machinery or apparatus for cutting velvets or other similar piled fabrics.* Dated Aug. 25, 1857. (No. 2255.)

This relates to such pile fabrics as are woven face to face, and consists in apparatus whereby the patentees are enabled to cut the double cloths apart by a small cutting knife, which travels rapidly from selvage to selvage, backwards or forwards, as the cloth passes through the machine.

Gedge, J. *Improvements in the manufacture of soap.* (A communication.) Dated Aug. 26, 1857. (No. 2256.)

The patentee has a caldron (heated by steam or a furnace), into which he throws cocoa-nut oil and resin. When these are melted he adds alkali of the strength 1,260, or thereabouts. The whole must be again boiled, and during boiling, water is added three times. He next throws in muriate of soda to separate the lees, and withdraws the saponaceous mass, throws away the lees, and the first operation is finished. He now commences the second by throwing into a copper cocoa-nut oil, and melting it. When melted he mixes with it alkali, the same strength as before, and boils the whole. To these he adds water. After ebullition he takes all the saponified substance obtained by the first operation, and

mixes it with that made by the second. When the mixture is complete, and has boiled, he throws in glue, and then the complete soap is poured into frames in the ordinary manner. The patentee describes modified processes.

HARGREAVES, W. *Improvements in screw gills for preparing wool and other fibrous substances.* Dated Aug. 26, 1857. (No. 2258.)

These consist of a flat boiler fixed between the top and bottom fallers of the screw gills, which is to be heated by steam or hot water; the boiler also acts as a saddle for the gills or fallers to slide upon; it also gives out a great amount of heating surface to the gills or fallers, which makes the wool, &c., work more kindly when passing through the gills or fallers. Also, the patentee uses apparatus heated with steam or hot water, instead of the ordinary rollers, for feeding the gills or fallers with. Also, two horizontal shafts placed under the lower tier of the fallers, with two cams or fingers in the form of a C attached to the shaft for raising and lowering the fallers.

NEWTON, A. V. *Improved machinery for kneading dough.* (A communication.) Dated Aug. 26, 1857. (No. 2260.)

This consists, not only in mixing the flour, water, and yeast, &c., thoroughly, but in opening the mass, dividing it, and re-uniting it repeatedly by means of a "flopper," thereby causing air to enter it and be retained within it in large quantities, and distributed throughout it in small cellules, making a very light bread with a small quantity of yeast or ferment.

NEWTON, A. V. *Improved means of operating slide valves for the induction and eduction of steam in reciprocating steam engines.* (A communication.) Dated Aug. 26, 1857. (No. 2262.)

This consists in means by which slide valves have imparted to them, in a very sudden manner (through the direct agency of the steam in the valve chest of an engine, as the stroke of the piston of the engine terminates in either direction) the movement necessary to change the course of the steam through the passages to drive the piston in the opposite direction.

GOODWIN, J., and A. BOYD. *Improvements in cleansing printed cotton and silk fabrics from colouring matters.* Dated Aug. 26, 1857. (No. 2263.)

This consists in cleansing fabrics from the colours diffused over them during printing, by washing the fabrics in cold water, boiling them with sifted cinders (of mineral coal, by preference), and then washing them.

BROWN, T. *Improvements in machinery for raising and lowering weights.* Dated Aug. 26, 1857. (No. 2265.)

This invention was described and illustrated at page 252, No. 1805, Vol. 68.

HARLING, W., J. M. TODD, and T. HARLING. *Improvement in looms.* Dated Aug. 27, 1857. (No. 2267.)

This relates to releasing the yarn from the yarn beam as it is required to be woven, and consists in employing lever breaks acting on break wheels connected to the shaft of the yarn beam, or upon the beam flanges or break wheels connected to the yarn beam itself, the lever breaks being weighted. The patentees also place the break wheel on a counter-shaft, and employ gearing to obtain more power and pressure upon the yarn beam with less diameter of break wheel, length of lever, and size of weight.

THOMPSON, C. and J. *Improvements in apparatus for discharging condensed water, air, or other fluids from steam pipes, drying cylinders, and other apparatus where steam is used.* Dated Aug. 27, 1857. (No. 2268.)

These consist in an automatic arrangement of apparatus comprising a tap, pinion, stationary rack, &c., for carrying off the air and condensed steam or water and other fluids from any description of steam pipe or vessel, without the usual loss attendant upon their escape.

NEWTON, A. V. *Certain improvements in bakers' ovens.* (A communication.) Dated Aug. 27, 1857. (No. 2269.)

This relates to a system of endless suspension chains for supporting trays of bread, &c., during the baking process.

LÖBNITZ, J. H. C., and J. M'L. HENDERSON. *Improvements in steam engines.* Dated Aug. 27, 1857. (No. 2270.)

This invention relates to various arrangements of steam-engines suitable for various purposes, but especially applicable for screw steamships. Each set of engines comprehends four separate working steam cylinders, disposed in pairs across the ship, the pistons of each pair working in concert, the steam being supplied through one valve to both cylinders, so that the whole virtually operates like a single pair of cylinders.

AYTOUN, R. *Improvements in safety cages or apparatus for mines.* Dated Aug. 27, 1857. (No. 2271.)

In cages fitted up according to this invention four strong blade springs are provided for each cage; two for each guide in the shaft. These springs have a constant tendency to clip the guides, and have a strong frictional hold upon them. The

lower portions of these springs are firmly attached to the cage body, whilst their upper ends are jointed by links to a set of levers carried by the cage top. The inner ends of these levers are jointed to fixed centres upon the cage whilst their outer ends are connected to the winding rope. The result is that, on the failure of the rope, the springs clip the guides, and hold the cage firmly up.

GENTIL, F. X., and E. *Improvements in preparing and treating asphodel in order to obtain alcohol.* Dated Aug. 27, 1857. (No. 2272.)

The patentees claim the manufacture of alcohol from asphodel roots. 1. By cutting the tubercles only into pieces of more than ⅜ in. thick. 2. By treating them with a restricted quantity of sulphuric acid at 53°, limited between 2 and 7 per cent. of the weight of the roots. 3. By treating those roots two or three times with sulphuric acid, as specified. 4. Extracting the used roots, the mode of saturating and refrigerating the syrup by the means indicated. 5. Heating the water by passing it through the residues preparatory to maceration, as described.

COMPLETE SPECIFICATIONS FILED WITH APPLICATIONS.

BODMER, R. *Improvements in machinery or apparatus for winding, unwinding, reeling, cleansing, measuring, sorting, weighing, twisting, and doubling silk, and other fibrous substances.* (A communication.) Dated Sept. 29, 1857. (No. 2508.)

This invention comprises sixteen features, which cannot be described without engravings.

PARKER, J. *Certain new and useful improvements in machinery for grinding card cylinders for carding engines.* Dated Oct. 6, 1857. (No. 2558.)

The inventor employs a grinder, of a length much less than the width of the card cylinder, or the distance of the traverse motion of said grinder. For a more complete description of this invention, the drawings of the specification must be consulted.

ASHCROFT, E. H. *An improved mode of preventing the over-heating and bursting of steam-boilers.* (A communication.) Dated Nov. 11, 1857. (No. 2849.)

This consists in a mode of applying fusible metal to a boiler, by inserting at a point below the water-line a pipe which extends out of the boiler and has at a suitable distance from the boiler a stopping plate of fusible metal, so arranged that by a free exposure of the pipe to the atmosphere, the water contained in the pipe shall have its temperature so far reduced by radiation as to preserve the fusible plate in a solid state, such plate being easily melted by the steam when the water level shall have fallen so low as to admit the steam into the pipe. When the plate of fusible metal has melted, the steam issuing from the pipe may be conducted into the furnace, extinguishing the fire. Or the steam may be used to give notice by an alarm whistle.

GEDGE, J. *Improved means for stopping or retarding carriages used on ordinary roads.* (A communication.) Dated Nov. 17, 1857. (No. 2879.)

This has for its object the fixing of a break on the fore wheels of carriages so that the wheels are instantly fixed, as by a drag chain, as soon as the horses stop.

WARD, F. O. *Improvements in manufacturing manure and obtaining accessory products.* (Partly a communication.) Dated Dec. 5, 1857. (No. 3023.)

The only sorts of mixed refuse or materials to which the present invention relates, are those containing azotised matter not readily putrescible (as wool, leather, or silk), mixed or combined with vegetable fibre (as cotton, flax, hemp), or with greasy matter (as oil). Mixed rags are the most important example of materials containing azotised matter not readily putrescible together with vegetable fibre; the refuse of the wool manufacture called shoddy is the principal mixed material containing such azotised matter imbued with oil. The inventor employs a novel combination of means having for their result to bring the azotised portion of mixed materials quickly, and at little cost, into a peculiar condition, in which, while retaining their form, they are hydrated or increased in weight by the fixation of a proportion of water, at the same time being rendered crisp or incoherent, and undergoing a marked change as to their chemical composition and qualities; becoming, for example, soluble to a great extent in water, capable of yielding rapidly, when applied to the soil (among other things), uluric acid and ammonia, and forming when pulverised a portable manure of very superior quality. A further result of this new combination of means is to shorten and facilitate the process of treating such materials, when manufacturing manure, and recovering products therefrom.

BARTON, J. E. *An improvement in winding worsted on to the creel bobbins of carpet looms.* Dated Dec. 17, 1857. (No. 3100.)

This consists in combining worsted winding machinery with swifts or reels, so that

worsted may be wound directly on to the creel or carpet bobbins from the skeins or hanks. Reference to engravings are essential to a description of the invention in detail.

BROAD, J. *The construction of a pressure or fountain lamp, to burn with safety from ignition in the overflow and from explosion, all bituminous, carbonaceous, and resinous oils, spirits, and naphthas, or admixtures thereof, also the products of Rangoon earth oil, or petroleum: also, to adapt all pressure and fountain lamps to burn these substances which are found to ignite in the overflow and cause explosion, &c., in all such lamps as at present constructed.* Dated Dec. 17, 1857. (No. 3103.)

The inventor prefers to construct the reservoir of his lamp in the form of a cylinder, and to use a spiral spring piston with valves, rack, &c. A written description of his lamp is given in the specification, but it would scarcely be found intelligible without engravings.

DARLING, S. *An improved pencil sharpener.* (Partly a communication.) Dated Dec. 18, 1857. (No. 3111.)

In its general form this pencil sharpener resembles an ordinary candle extinguisher, being a hollow cone with a handle at its apex. This cone is formed into a conical cutter, by making in its sides a longitudinal slot, and by fixing in this slot a thin blade, with its edge towards the interior of the cone, and projecting slightly beyond the inner surface.

WINSLOW, C. *An improvement in the manufacture of "elastic gore cloth."* Dated Dec. 18, 1857. (No. 3112.)

The elastic fabric on which this invention is based is either one made of common cloth and stretched, and united by an elastic cement, or that patented in America 6th of May 1856, by H. G. Tyler and J. Helm, composed of two pieces of cloth, made with the threads of the weft in a diagonal position, or at an acute angle to the threads of the warp, and caused to adhere by a cement of india-rubber or gutta-percha. The inventor claims an elastic band or gore cloth, when made not only of a fabric composed as before described, but with the edges of the cloth cut and overlapped, and cemented down in lines out of parallelism with either the warp or weft threads, the line of maximum elasticity in the binding making that angle with the warp as well as the weft which is the complement of half the angle which they make with each other.

COTTRILL, J. *Improvements in the manufacture of certain descriptions of needles.* Dated Dec. 28, 1857. (No. 3175.)

This refers to sail-making needles, packing needles, glovers' needles, and others which are most conveniently made either oval, flat, triangular, or three-square, or four-sided in section for any portion of their length, and the improvement consists in grooving or fluting the sides of such needles in the manner in which the sides of a bayonet blade are fluted. The inventor does not confine himself to any mode of effecting this, but he finds the process of stamping in the flutes by suitable matrices and ribbed dies or hammer-heads to be well adapted for the purpose, afterwards clearing out the flutes, if necessary, with rotating cutters mounted on a lathe, and working like a circular saw, or by revolving stones.

MURPHY, J. *Improvements in wheels used on railways.* Dated Jan. 1, 1858. (No. 2.)

This consists in causing the inner periphery of the tyre to dovetail or fit into the outer periphery of the skeleton; and in so rolling bars of iron that each bar may form ribs of the shape and angles required for insertion into the dovetails of the tyre.

MENNONS, M. A. F. *Certain improvements in gas retorts.* (A communication.) Dated Jan. 16, 1858. (No. 70.)

These improvements cannot be described without engravings.

CLARK, W. S. *Improvements in copying presses.* (A communication.) Dated Feb. 10, 1858. (No. 248.)

This consists in an arrangement of links and levers at the opposite sides or ends of a portable press, by which the platen and bed plate are thrown apart or drawn together to produce the required pressure, and are so arranged and operated that when the book is placed in, and pressure applied, it forms a clamp thereto, occupying but little more space than the book alone.

MONSON, C. *A new and useful mechanism or apparatus, to be used for supporting one or more gas-burners, and conducting gas to such or other various useful purposes.* Dated Feb. 17, 1858. (No. 299.)

This consists in a peculiar arrangement of tubes, and a series of levers by which the whole apparatus may be extended or contracted, and a clear passage for gas or a fluid be still maintained throughout the tubes. In carrying it out the inventor makes use of a system of levers jointed together, and known as lazy tongs.

FOSTER, W. K. *An improvement in the manufacture of blades for pencil sharpeners or other articles of like nature.* Dated Feb. 27, 1858. (No. 370.)

The inventor claims, for supporting small pieces of metal, and aiding in the reduction

to wedges or knife blades under the action of a grinder or grinding wheel; a gauge bed, plate, or holder, constructed with recesses, is used, such bed being moved under the grinder, or the grinder moved over it, so as to successfully reduce each of the blanks that may be within its recesses.

DESSALES, A. J. *Improvements in oil lamps for railway carriages, ships' cabins, and other purposes.* Dated Feb. 27, 1858. (No. 386.)

The inventor forms the oil box circular underneath, but in the centre of it places his burner, connected with the oil box by two arms or oil passages. To the exterior of one of the arms he fixes a lever for sliding forward a moveable wedge, to which a valve rod is attached. This valve rod passes from the wedge through an internal tube in the arm, and terminates in a valve plate at the mouth of the supply pipe. At the outside of the valve plate is a spring, which presses upon the valve plate when the lever is reversed, and effectually prevents the flow of oil to the burner when not required for use.

PARSONS, G. J., and T. PILGRIM. *Improvements in the mode of raising the temperature of steam generated in steam-boilers, and using the same for working steam-engines.* Dated Mar. 3, 1858. (No. 422.)

This consists in taking the steam from the steam chest, and causing it to pass through and across the furnace, so that it may be further heated before it enters the ordinary steam-pipe leading to the engine.

EYLAND, C. *An improvement or improvements in certain descriptions of buckles.* Dated Mar. 4, 1858. (No. 436.)

This refers to band buckles employed commonly upon waistcoat or trowsers backs; and the improvements consist in peculiarly shaping certain parts of these buckles, so that the band to which one is attached can be readily tightened or slackened with one hand only.

HARRIS, D. *A new and useful or improved sewing machine.* Dated Mar. 20, 1858. (No. 577.)

This cannot be described without engravings.

WILLIAMS, R. *An improvement for manufacturing soap for cleansing, bleaching, and purifying purposes.* Dated Mar. 27, 1858. (No. 648.)

This is precisely the same invention as that for which the inventor obtained provisional protection (No. 2,502) on the 29th Sept., 1857.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

ELWIN, H. *Improvements in governors for steam and other engines.* Dated Aug. 26, 1857. (No. 2261.)

Here, in place of depending entirely on the weight of the diverging balls and their connections for regulating the movements of the cut-off valve, the inventor forms the upper end of the central rod or spindle of the governor hollow, to receive a rod which carries a weight at its upper end. This rod bears upon the rising and falling piece or collar, which is connected to the diverging arms of the ball governor, and always gives the collar a tendency to regain its lowest position, and keep up an ample supply of steam to the engine. There are modifications included in this invention.

WEBB, J. *An improved hopper.* Dated Aug. 26, 1857. (No. 2264.)

The object here is to crush two kinds of grain simultaneously through the use of one hopper only; but the apparatus employed cannot be described without engravings.

MCISAAC, J. *A machine or apparatus for washing or churning.* Dated Aug. 27, 1857. (No. 2266.)

This consists in placing a vessel on rockers; into this vessel the inventor introduces the clothes to be washed, or the cream to be churned, and imparts motion to it.

SHANKS, A. *Certain improvements in machines for shaping and cutting metals and other substances.* Dated Aug. 27, 1857. (No. 2273.)

The inventor employs rotary cutters so formed of separate pieces of steel that they can be hardened and tempered individually, the whole being made into a wheel by first tinning the pieces of steel and uniting them in one mass by molten metal, so that the heat does not injure their temper and cutting qualities. In using these rotary cutters the inventor employs a compound movement, progressive and lateral, so as to produce grooves or channels of various widths by the same cutter. He also uses a pantographic movement when desired for curved lines.

SMITH, W. *An improvement in the manufacture of size made from gelatine.* Dated Aug. 28, 1857. (No. 2275.)

This consists in the addition in certain proportions of nitrate of baryta to ordinary gelatine size.

MUCKHART, J. *Improvements in effecting the combustion of fuel, and the consumption or prevention of smoke, applicable to boiler furnaces.* Dated Aug. 28, 1857. (No. 2276.)

This relates to the construction of boilers with duplex furnaces, each furnace being supplied with fuel, and worked so that its unconsumed gases shall be operated upon and turned to practical account by the heat of the incandescent fuel of the other furnace.

PROVISIONAL PROTECTIONS.

Dated March 22, 1858.

596. Aaron Lester, of Coventry, ribbon designer. Improvements in weaving ribbons, fringes, trimmings, and other narrow fabrics.

Dated April 9, 1858.

768. Jean Baptiste Biebuyck and Joseph Van Landuyt, of Brussels, merchants. An improved process for separating the vinous and amylaceous principles from vegetable substances.

Dated April 14, 1858.

804. Marc Antoine François Mennons, of Paris. Improvements in obtaining motive power, and in apparatus connected therewith. A communication.

Dated April 20, 1858.

860. Eugene Derogy, of Paris, optician. Improvements in instruments and apparatus applicable to photographic purposes.

Dated April 23, 1858.

896. William Ryder, of Bolton-le-Moors, spindle and flyer maker. Improvements in preparing moulds and moulding boxes for casting metal or other materials.

Dated April 24, 1858.

904. Alexander Southwood Stocker, of Wimpole-street, Cavendish-square, gentleman. Improvements appertaining to articles to be affixed to boots and shoes, and to the feet of animals, and in the machinery and means employed for producing the same.

Dated April 27, 1858.

932. Bernard Drukker, of High-street, Whitechapel, shirt-maker. Improvements in making shirts.

938. David Edward Hughes, of New York, telegraphic engineer. Improvements in the means of, and apparatus for, transmitting signals and electric currents.

Dated May 3, 1858.

987. William Clark, of Chancery-lane. Improvements in separating and in otherwise treating matters in a state of fusion, and in apparatus for the same. A communication from A. De Rostaing.

Dated May 4, 1858.

990. William Henry Morrison, of Nottingham, manufacturer. Improvements in means or apparatus employed in the manufacture of bonnet and cap fronts, rouches, and such like articles of milinery.

Dated May 5, 1858.

994. Richard Sharp, of Liverpool, pianoforte manufacturer. Improvements in pianofortes.

998. Thomas Preston, of Nottingham, manufacturer. Improvements in the manufacture of cut pile fabrics in warp machines.

1000. John Lawson and Thomas Robinson, of Leeds. Improvements in machinery for hackling and dressing flax, and other fibrous substances.

Dated May 6, 1858.

1004. Marcus Davis, of Lyon's Inn. Improvements in carriage wheels, and in means of retarding their motion.

1006. Joseph Whitley, of Leeds. Improvements in the manufacture of iron, which improvements are also applicable when obtaining other metals from their ores.

1008. Edward John Scott, of Glasgow, shoe manufacturer. Improvements in the manufacture of boots and shoes.

1010. Thomas Wood Thacker, of Derby, pianoforte dealer. Improvements in the construction of the finger-ends of pianoforte, organ, and harmonium keys.

1012. John Casey, silk manufacturer, and James Hughes, silk weaver, both of Spital-square. Improvements in looms for weaving velvet ribbons.

1014. William Clark, of Chancery-lane. Improvements in bits for horse's bridles. A communication.

1016. Henry Jackson, of Leeds, engineer. Improvements in machinery for dressing and cleaning flax, hemp, and other fibrous substances requiring like treatment.

Dated May 7, 1858.

1018. Joseph Bunnett and Joseph George Bunnett, of Deptford, engineers. Improvements in steam-engines.

1020. John Castle, of Grantham, coachmaker. Certain improvements in breaks used for retarding the motion of carriages on ordinary roads.

1024. James John Field, of Paddington, chemist. Improvements in evaporating or in extracting moisture from liquids, and from substances in a liquid state, and in apparatus to be employed therein.

1026. William Edward Newton, of Chancery-lane. Improvements in the construction of fire-grates for furnaces, stoves, and other fire-places. A communication.

1028. Charles Botten, jun., of Clerkenwell, engineer, and Nathaniel Fortescue Taylor, of Stratford, gas-engineer. Improvements in means and apparatus employed in measuring and in regulating the flow of gas and other fluids.

1030. Thomas Brown, of Ebbw Vale, Monmouth, iron manufacturer, and David Brown, of Cwmbran, Monmouth, manager of works. New or improved machinery for filing or smoothing the ends of fish-plates, rails, wrought-iron railway chairs, and other articles made by sawing bars transversely.

1032. William Clark, of Chancery-lane. Improvements in apparatus for sharpening saws. A communication.

Dated May 8, 1858.

1033. John Thomas Robson, of Hugh-street, West Pimlico, engineer. Improvements in sheet-flue and tubular boilers. A communication.

1034. Alfred Vincent Newton, of Chancery-lane. Improvements in machinery for manufacturing paper. A communication.

1035. William Edward Newton, of Chancery-lane. Certain improvements in grinding circular saws. A communication.

1037. George Day, of Old St. Pancras, coppersmith. An improved self-acting valve for regulating the flow of liquids.

Dated May 10, 1858.

1039. Charles Frédéric Vasserot, of Essex-street, Strand. Improvements in the manufacture of umbrellas and parasols. A communication from P. T. Trocard, of Cauderon, near Bordeaux.

1041. William Henry Ogden, of Liverpool, ironfounder. Improvements in pumps.

1042. William Charlton Forster, of Great Tower-street, gentleman. An improvement in the manufacture of bricks and slabs for preventing damp in the walls of houses and other buildings.

1043. Isaac Lowthian Bell, of the Washington Chemical Works, Newcastle-upon-Tyne. Improvements in the manufacture of iron.

1044. Jacques Marie Edouard Masson, of Evreux, France. Improvements in diving apparatus.

1045. Robert Willan and Daniel Mills, of Blackburn, machine makers. Improvements in machinery or apparatus for drawing-in, twisting, or looming textile materials.

1046. William Garnett Taylor, of Ashby-de-la-Zouch, gentleman. Improvements in covering the rollers employed in spinning cotton and other fibrous materials.

1047. John Bedford Pim, of Newington Butts, stationer, and Charles Payne, of Bermondsey-street, Southwark, licensed victualler. Improvements in recovering useful matters from oil or floor-cloth, tarpaulin, American leather cloth, and other like substances.

Dated May 11, 1858.

1048. Pietro Apparuti, of Paris. A machine applicable for picking and choosing out corn.

1049. Jozé Luis, of Welbeck-street, Cavendish-square. A mechanical washing apparatus for iron ore and other matters. A communication.

1050. George Henry Cresswell, of Devonport. Improvements in pads and apparatus for inking stamps.

1051. John Henry Johnson, of Lincoln's-inn-fields. Improvements in madder dyeing. A communication from R. Patterson, of Philadelphia.

1052. Edward Fairburn, of Mirfield, York, card manufacturer. Improvements in machinery or apparatus employed in carding wool or other fibrous substances.

1053. James Soutter, of Hoxton, engineer. Improvements in washing machines.

1054. William Pare, of the Seville Ironworks, Dublin. Improvements in metallic and other bedsteads, and other articles of furniture.

1055. Alexander Parkes, of Birmingham. Improvements in the manufacture of tubes and cylinders.

1056. Alexander Parkes, of Birmingham. Improvements in rollers or cylinders used for printing and embossing.

1057. William Oliver, of Cradley, Worcester, engineer. Improvements in combining ovens for the manufacture of coke with the furnaces of steam boilers.

1058. Robert Halliwell, of Bolton-le-Moors, foreman. Certain improvements in mules for spinning and doubling cotton and other fibrous materials.

1059. George Lowry, of Salford, Lancaster, machinist. Certain improvements in machinery for heckling flax and other fibrous materials.

1060. James Montgomery Gilbert, of Manchester, engraver. Improvements in the construction of cylinders and maundrils used in printing calico and other surfaces.

1061. John Dyson, Edwin Wilkinson Shirt, and Henry Shirt, of Tinsley Works, near Sheffield, steel rollers. Improvements in the mode of rolling strips of steel for crinoline and other purposes.

Dated May 12, 1858.

1063. Louis Durand, of Marseilles, civil engineer. An improved tubular steam generator.

1064. M. Diosy, of Fenchurch-street, Agent for Chollet and Co., of Paris. Improvements in machinery for preparing or manufacturing granulated potatoes for preservation. A communication.

1065. Joseph Apollon Détroyat, of Paris, hairdresser, and Faustin Teubert, of Paris, hatter. Improvements in apparatus for cleansing hair combs, and other similar articles.

1066. Joseph Augustus Clarke, of Liverpool, engineer. Improvements in composition for coating vessels' bottoms.

1067. William Mark, of Stockton-on-Tees. Improvements in roofing and other tiles.

1068. Joseph West, of Sheffield, brass turner. A mode of covering and securing water-taps and branches.

1069. Alfred Henry Rogers, of Fairfield, near Manchester, engineer. Improvements in lubricators.

1070. James Sharples, of Crawshaw Booth, Lancaster, madder dyer. Improvements in extracting moisture from and drying porous and fibrous substances.

1071. Richard Knight, of Foster-lane, Cheapside. Improvements in apparatus for refrigerating, also for bottling aerated liquids, and in the preparation or storing salts for the production of artificial mineral waters.

1072. Joseph Gratian Jackson, of Belper. A method of carrying roads over (or through) land covered with water.

1073. James Biggs, of Norton Folgate, City, tobacco manufacturer. Improved apparatus for compressing vegetable and other substances.

1074. Alfred Léonor Liétout, of Paris. Improved portable medical and hygienic gymnastic apparatus.

1075. Joseph Sharp Bailey, wool comber, and William Henry Bailey, mechanic, both of Keighley, York. Improvements in machinery for preparing and combing wool, cotton, and other fibrous materials.

1076. John Hamilton, of Belfast, starch manufacturer. Improvements in the preparation and use of starch for manufacturing, bleaching, and finishing purposes.

Dated May 13, 1858.

1077. William Simons, of Glasgow, ship builder. Improvements in the construction of iron ships or vessels.

1078. Robert Hislop, jun., of Preston Pans, North Britain, farmer. Improvements in machinery or apparatus for dressing or cleansing and separating grain and seeds.

1079. Alexander Mills Dix, of Hanley, Stafford, brewer. Certain improvements in the process of brewing or obtaining decoctions, and in apparatus connected therewith, which apparatus is also applicable to condensing, refrigerating, or other such like purposes.

1080. Felix Alexandre Deliry, of Soissons, France, baker. An improved mechanical kneading trough.

1081. Auguste Wolff, of Paris. Improvements in musical instruments.

1082. Hiram Hyde, of Truro, Nova Scotia, gentleman. An improved mode of, and improved apparatus for, manufacturing oils. A communication.

1083. Joseph Gardner, of Banbury, Oxford, ironmonger. An improvement in chaff-cutting machines.

Dated May 14, 1858.

1084. Frederick Warren, of Birmingham, mechanical engineer. Improvements in the construction of stands for telescopes and other instruments.

1085. John Colgate, of Exmouth-street. A "pipe case handle" for walking-sticks, canes, riding whips, and umbrellas.

1086. Samuel Carpenter, of Flushing, New York. Improvements in escapements for watches and other timekeepers.

1087. David Dick, engineer, of Paisley. Improved cushions for trusses and other similar uses.

1088. William Edward Newton, of Chancery-lane.

Improvements in the construction of lamps. A communication.

1089. George Frederick Chantrell, of Liverpool, furnace engineer. An improved waterproof lithic paint.

1091. Louis Pêtre, of Hatton-garden, glass silverer. Improvements in the application of glass to ornamental and useful purposes.

Dated May 17, 1858.

1092. John Henry Johnson, of Lincoln's-inn-fields. Improvements in the construction of artificial legs and feet. A communication from D. Bly.

1094. John and William Allen, of Wallsend, Northumberland, manufacturing chemists. Improvements in the treatment of iron and copper pyrites, and in apparatus for same.

1096. Julius Wittenberg, of Cambridge-villas, Notting-hill, Doctor of Philosophy. Improvements in motive power engines actuated by air.

1098. Walter Raymond, of Dalston, master mariner. Improvements in life rafts.

1100. Selah Hiler, of Haverstraw, New York. An improved method of coating or amalgamating iron with silver, copper, brass, or other metals, or alloys of metals.

1102. Samuel Higgs, jun., of Penzance. An improvement in separating or precipitating copper from water having it in solution.

Dated May 18, 1858.

1104. William James Hixon, of Victoria-grove-terrace, Bayswater. Improvements in the construction of reaping and mowing machines, and in the form or shape of the knife or knives to be used in connection therewith.

1106. James Mallison, jun., of Bolton-le-Moors, yarn agent. Improvements in the process of, and in the machinery or apparatus for, dyeing yarns.

1108. Ernest Ciprien Brochand, of Gerrard-street, miller. A travelling mill and improved millstones, part of the invention being applicable to other apparatus turned or worked by horses.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," June* 1, 1858.)

103. W. Conisbee. Improvements in printing machines.

105. J. H. Wheatley. Improvements in printing machines.

113. J. S. Brown. Improvements in mills for grinding corn or other substances.

121. A. Sterry. Improvements in safety lamps.

132. J. J. Welch and J. S. Margetson. An improved expanding or folding travelling bag, or wallet.

136. J. Garnett and P. Garnett, jun. Improvements in the manufacture of felt.

137. P. Hill. Improvements in machinery for making cams, and for cutting and shaping metals and other materials.

149. J. W. Midgley. An improved construction of covered roller, to be used in preparing and spinning machinery.

152. P. Bussi. An improved railway carriage. A communication.

159. J. Bethell. Improvements in the manufacture of coke and fuel.

161. E. Hammond. The manufacture of cap fronts, and applicable to the manufacture of ruches, ribbon trimmings, and other articles of milinery.

165. R. Weare. Improvements in galvanic batteries.

173. R. Coleman. Improvements in agricultural implements.

195. A. Hollis and S. Lee. Improvements in the construction of chaldron-wagon and other railway wheels.

596. A. Lester. Improvements in weaving ribbons, fringes, trimmings, and other narrow fabrics.

660. W. Chadwick. Improvements in the hoods or tops and in the footsteps and bearings of ventilators.

704. A. Pelez. A new apparatus for deepening rivers and rendering them navigable. A communication.

844. C. Hawker. An improved manufacture of cartridge for fire-arms. Partly a communication.

930. J. H. Bennett. An improved arrangement of safety valves for steam, gas, or any aireform or liquid body

978. L. Talabot. Improvements in rolling railway and other bars.

998. T. Preston. Improvements in the manufacture of cut pile fabrics, in warp machines.

1017. W. Wallis, W. Langford, and J. Slack. Improvements in pressure gauges.

1055. A. Parkes. Improvements in the manufacture of tubes and cylinders.

1056. A. Parkes. Improvements in rollers or cylinders used for printing and embossing.

1057. W. Oliver. Improvements in combining ovens for the manufacture of coke with the furnaces of steam boilers.

1059. G. Lowry. Certain improvements in machinery for heckling flax and other fibrous materials.

1061. J. Dyson, E. W. Shirt, and H. Shirt. Improvements in the mode of rolling strips of steel for crinoline and other purposes.

1081. A. Wolff. Improvements in musical instruments.

1086. S. Carpenter. Improvements in escapements for watches and other time-keepers.

1115. J. Bottomley and A. H. Martin. Improvements in means or apparatus employed in weaving.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

1191. Frederick Herbert Maberly.
1203. John Avery.
1230. George Rogers.
1231. William Arthur Henry.
1243. Charles Tennant Dunlop.
1263. Henry Cartwright.
1287. Alexander Morton and Edmund Hunt.

LIST OF SEALED PATENTS.

Sealed May 28th, 1858.

2972. Thomas Kaye.
2985. Denny Lane.
2989. Joseph Eccles.
2991. William Bird, Richard Ashton, and Thomas Bird.
3036. Charles Nightingale.
3058. William Denne.
3163. Henry Charles Fenwick Wilson and Thomas Green.
3183. Edwin Gomez and William Mills.
236. Edward Reader and John Dewick.

384. William Chadwick.
444. Jonathan Nash Hearder.
587. William Edward Newton.
606. Charles Clifford.
690. Robert Peter.
749. Elbridge Foster.
752. Stephen Orator Mason.
753. Edward Richmond.

Sealed June 1st, 1858.

2986. Thomas Jefferson Thompson.
2998. Louis Frederic Ernest Ciceri.
3003. Charles Henwood.
3004. William Parsons and James Attree.
3021. John Brinton and James Crabtree.
383. William Compton Smith.
641. Joshua Horton.
679. Frederick Albert Gatty.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICES TO CORRESPONDENTS.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

The publication of several communications is unavoidably deferred.

Errata.—P. 513, col. 1, line 7 from bottom, *for* "translations" *read* "transactions." P. 513, col. 2, line 11 from bottom, *for* "denoting" *read* "describing." P. 514, col. 1, line 7 from bottom, leave out the "—" before "to which it is applied."

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OIL MILL MACHINERY.

Fig. 12.

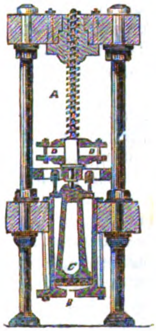


Fig. 13.

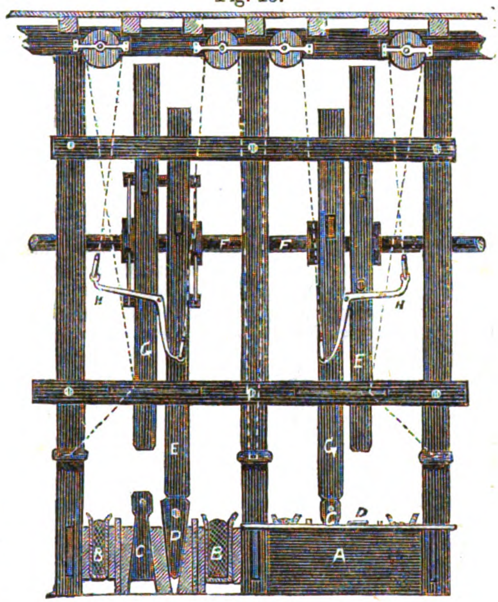
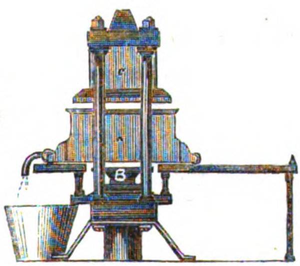


Fig. 14.



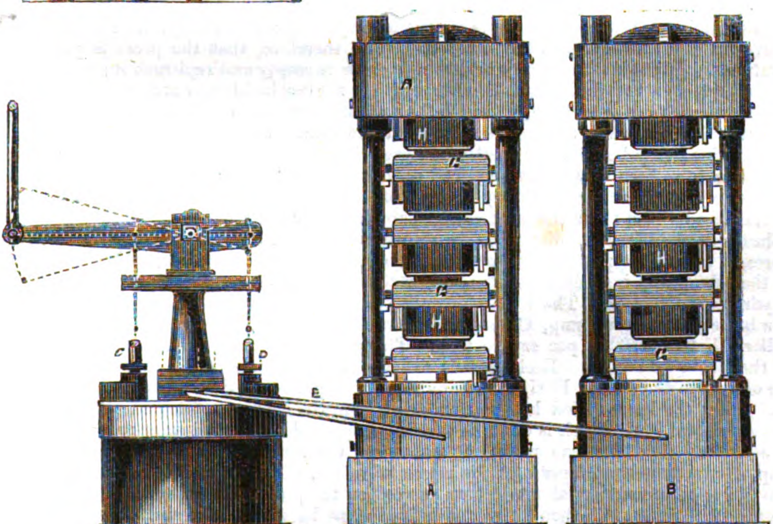


Fig. 15.

OIL MILL MACHINERY.

(*Concluded from page* 556.)

The final operation of expressing the oil is effected in the screw press, as shown in Fig. 12, by means of an ordinary square threaded screw, A, by which the bag of seed is compressed between the bottom of the box, B, and the moveable plate, C. The power is applied by means of a loose lever inserted between studs fixed in the plates, D, which are attached to the screw. The press may be made in a vertical form, and may also be made to lie horizontally, and to be worked either by hand or by power. A very large amount of pressure may be obtained by one of these presses, but the wear and tear and derangement are excessive, and there are few screw presses in existence at the present day giving a correct idea of the exact proportions of pressure applied.

The stamper press is shown in Fig. 13. It consists of a long rectangular cast-iron box, A, open at the top, at each end of which there are two plates between which one bag of seed, B, is placed, yielding a cake weighing 9 lbs.; next to one of the inner plates is placed a filling-up piece, then an inverted wedge, C, then another filling-up piece, after which is introduced the vertical driving wedge, D, and lastly, another filling-up piece is inserted between the driving wedge and the other inner plate. As soon as the bags, B, have been placed vertically in the press box in the usual manner, a stamper, E, made of wood, about 16 feet long and 8 inches square, with a fall of about 22 inches in the final stroke, is allowed to fall at the rate of 15 strokes per minute for a period of about 6 minutes upon the head of the driving wedge, D, which is sufficient to drive it down level with the top of the press box, A, the stamper being worked by two cams or wypers on the revolving shaft, F. Side by side with the stamper, E, is a second stamper, G, immediately above the inverted wedge, C, which is held suspended at a fixed point by means of the lever, H, while the first stamper, E, is in action; but as soon as it is time to remove the bags, the stamper, E, is raised by means of the lever, H, above the point at which the cams come into contact with it, and by the same means the other stamper, G, which was previously suspended, is allowed to fall upon the inverted wedge, C, driving it downwards, and thereby releasing the working wedge, D, so that the attendant may remove the bags and repeat the operation. A press like this will not do more than about 12 cwt. of cake per day.

The last mode of expressing the oil is by means of the hydraulic press, which may fairly be said to be the most approved system that has yet been adopted. This press is simply Bramah's press, arranged specially for the purpose of expressing oil, and appears to have been in use for this work more or less for thirty years, although the earlier presses were very defective as compared with those in use at the present time. One of the first hydraulic presses that was constructed is shown in Fig. 14. In this arrangement only one press and one set of small pumps was introduced. The box, A, which receives the seed is in one piece, and runs upon a small tramway for the purpose of withdrawing it from the press to remove the cake and replenish the bags; each time, therefore, that the press is put into operation, the entire box has to be withdrawn in order to empty and replenish it; and it has then to be replaced upon the ram, B, after which it is lifted bodily upwards so as to bring it into contact with the press head, C, which fits accurately in the press box, A, and acts as the point of resistance when the pressure is upon the ram. The constant withdrawal and lifting of this heavy box must evidently be a great loss of power and time. Presses of this description have been at work at Deptford until within the last few weeks, but they have now been removed and replaced by those known as Blundell's presses, which are now universally admitted to be the most efficient appliance for the purpose.

Blundell's double hydraulic press is shown in Fig. 15. It consists of two distinct presses, A and B, supplied by two pumps, C and D, one of which, C, is 2¼ inches diameter, and the other, D, 1 inch diameter, both connected to each distinct press cylinder by means of hydraulic tubing, E. The stroke of each pump is 5 inches, and they make 36 strokes per minute; the larger pump, C, is weighted to 740 lbs. per square inch pressure, and the smaller, D, to 5,540 lbs. per square inch. The diameter of the press rams is 12 inches, and the stroke 10 inches. Each press is fitted with four boxes, G G, and receives four bags of seed in the spaces, H H, producing in all a weight of 64 lbs. of cake at each operation. After the heated seed has been removed from the heating kettle and placed in the canvas and hair bags, which is done as speedily as possible, so that it may retain its heat, the attendant first fills one press, A, and opens the communication between the large pump, C, and the charged press, A, by means of valves, which causes the ram to rise until there is a total pressure of about 40 tons exerted on the press; the safety valve connected with the large pump, C, then rises, and is kept open by means of a small spring catch.

Whilst this operation is going on in the first press, A, the second press, B, is being filled in the same manner; the communication is then opened between the large pump, C, and the press, B, by means of the valves, the safety valve of the pump, C, having been replaced in its original position; the ram of the second press, B, is then raised to a corresponding position with that of the first press, A, when the safety valve of the pump, C, rises a second time. The communication between the large pump, C, and the press, B, is then closed, and at the same time a communication is opened by the valves between the small pump, D, and the presses; and the extreme pressure exerted by the small pump, D, amounting to about 300 tons, is allowed to remain upon the rams for about seven minutes from the time that they were first brought into action; this, together with three minutes allowed for emptying and charging the press, is the full time required for expressing the oil in the most effectual manner. The oil, in leaving the seed, passes through the canvas bag, and then through the hair bag, where it finds a free exit at the edges; thence it runs into a channel or groove which passes round the upper portion of each press box, G; a communication is made from one box to another by means of piping, L, so that the oil passes from the upper boxes through the lower ones, and thence into the cistern, which is called the spell tank, being just large enough to hold the produce of one day's work. These presses are not worked with water; it has been found that oil which is not of a glutinous description works much better, and keeps both the pumps and presses in a better condition. It is scarcely possible, if the presses are properly constructed, that they should meet with any accident; this can only occur where through carelessness an excessive weight is placed upon the safety-valve levers, or where the valves themselves are allowed to stick through want of cleanliness, from the attendant not taking care to remove the oil which sometimes becomes clotted round the valves. Each of these presses is capable of producing 36 cwt. of cakes per day of eleven hours, and the yield of oil may be taken at about 14 cwt. in the same time; this, of course, depends much upon the nature of the seed. The cake is trimmed or pared at the edges by means of a small paring knife, after which it is put into a kind of rack to allow it to cool and dry, so that it will not become mouldy when stacked. The oil is pumped from the spell tanks into larger tanks, capable of holding from 25 to 100 tons, where it is allow to remain for some time for the purpose of settling, previous to being brought to the market in that condition, or to undergoing various other processes such as refining, &c.

The question has now to be considered of the relative merits of the three descriptions of presses of the most recent date.

For all practical purposes the screw press is quite unfit to be compared with either the stamper or the hydraulic press, from the objection that it is constantly liable to break-downs when driven by steam power, there being no portion of the machinery that will yield if the pressure is not relieved in time either by the attendant or by some self-acting contrivance, the best of which are very uncertain in their action; whereas in the case of the stamper press, the stamper being loose and independent of the press box, any risk of breakage by an overstrain or excess of pressure is in a great measure avoided by the stamper recoiling and leaving the wedge at a fixed point after it is tightly driven home. It might be thought that, since a greater pressure can certainly be obtained by the screw than by the stamper press towards the latter portion of the operation, and from the fact of there being nothing which will yield except the seed, the screw press must consequently express the oil more speedily and effectually: but this is not the case, for the stamper is made of sufficient weight to enable it to extract all the oil, although at a slower rate; and the regularity in its working, owing to its freedom from break-downs, enables it to crush on an average quite as much if not more seed in a given time than the screw press. If the loss of profit during repairs and the cost of the repairs themselves be taken into consideration, there can be no doubt that the stamper press is far superior to the screw, notwithstanding that the former seems at first but a primitive appliance as compared with the latter. In this particular of freedom from break-downs, however, the hydraulic press is far superior to either of the other two; for the safety valves of the pumps rise at the precise moment when the requisite force is obtained; and the force can be increased far beyond that which can be obtained by either the screw or stamper. Independently, however, of this latter advantage, the hydraulic press combines in itself the good qualities of both the other presses, without their accompanying disadvantages. For in the hydraulic press there is a certain accumulation of force which is maintained for a sufficient length of time without any possibility of injury occurring to the machinery: whereas, as has already been observed, the accumulation of force in the screw is liable to be increased beyond a safe point, leading to the destruction of the apparatus; and in the stamper the very safeguard which it possesses in its tendency to recoil leads to a loss of

time whilst it is performing its duty. Taking into consideration, therefore, the freedom from derangement of the hydraulic press as compared with the screw, and its continuous action without loss of time or power as compared with the stamper, it certainly ranks higher than either as a mechanical appliance for the required purpose. The wear and tear in the working parts of the screw as compared with that in the other presses has been quite sufficient to drive it from the field, and to leave the only practical question between the stamper and the hydraulic press.

The practical conclusions from the results of working appear to be, that in the same sized mill the hydraulic presses produce about three times as much oil as the stampers: that they do this with less wear and tear: and at a considerable saving of labour, since the seed has only to be handled once: and that the general expenses in working the hydraulic mill as compared with the stamper, owing to the increased production, are much less per quarter of seed crushed; for the consumption of coal, general charges, and interest on plant, &c., will be the same whether 13,000 quarters per annum are crushed by the stampers or three times that quantity by the hydraulic presses.

In conclusion it may be interesting to give some particulars as to the extent of this manufacture. It appears from the official returns that the quantity of seed imported into this country for the oil manufacture was 364,000 quarters in 1841, increasing in ten years to 630,000 quarters in 1851, and amounting in 1856 to about 1,100,000 quarters; the last amount producing about 144,000 tons weight of cake, and 56,000 tons of oil.

The cake is used for feeding cattle; and the oil is used chiefly for painting, and a very large portion is again exported. The immense increase, however, in the quantity of cake produced shows either that there are more cattle fed upon it in this country than there were a few years ago, or that a much larger quantity of cake is consumed per head of cattle than used to be. It is difficult to ascertain correctly in which respect the greatest increase has taken place, but the increased consumption of cake may probably be attributed rather to the more general adoption of feeding cattle on linseed cake.

It appears that to crush the seed imported in 1856 there were required about 150 to 160 double hydraulic presses at work day and night; nearly 100 of these are at work in Hull, and the rest are distributed all over the country, the more important mills being in London, Liverpool, Grimsby, &c.

NEW PATENT BILL FOR INDIA.

In our Number for April 17th, 1858, we announced that it was the intention of the India Government to introduce a new Act for granting exclusive privileges to inventors. We are now enabled to state that on the 24th of April a Bill for this purpose was read a second time in the Legislative Council of India, and referred to a Select Committee, who are to report thereon after the 28th July next. In placing the provisions of this Bill before our readers we shall give the most important clauses in full, and abstracts only of those which are of minor interest. It should be observed that the sanction of Her Majesty to the passing of this Bill has been duly obtained and signified.

I. "The inventor of any new manufacture may petition the Governor-General of India in Council for leave to file a specification thereof. Every such petition shall be . . . . . signed by the petitioner or (in case the petitioner shall be absent from India) by an authorized agent, and shall state the name, addition, and place of residence of the petitioner, and the nature of the invention."

II. "Upon such petition, the Governor-General of India in Council may make an order authorizing the petitioner to file a specification of the invention."

III. "Before making such order, the Governor-General of India in Council may refer the Petition to any person or persons for inquiry and report," and such person or persons shall be entitled to a reasonable fee, to be paid by the petitioner: the amount, in case of dispute, to be settled by a judge.

IV. If, within six months from the date of such order, the petitioner cause a specification of his invention to be filed, he, his executors, administrators, or assigns, "shall be entitled to the sole and exclusive privilege of making, selling, and using the said invention in India, and of authorizing others so to do, for the term of fourteen years from the time of filing such specification, and for such further term (if any) not exceeding fourteen years from the expiration of the first fourteen years as the Governor-General of India in Council may think fit to direct, upon petition to be presented by such inventor, at any period not

more than one year, and not less than six calendar months, before the expiration of the exclusive privilege hereby granted."

V. An order authorizing the filing of a specification, or for extending the term of exclusive privilege, may be made subject to any conditions and restrictions the Governor-General of India in Council may think expedient.

VI. Every specification shall be in writing, and signed by the petitioner, "and shall particularly describe and ascertain the nature of the said invention and in what manner the same is to be performed."

VII. Every petition and specification shall be left with the Secretary to the Government of India in the Home Department, and shall be accompanied by a declaration in writing, signed by the petitioner; * and if the inventor be absent from India, the petition and specification shall also be accompanied by a declaration signed by the agent who shall present or file the same, to the effect that he verily believes that the declaration purporting to be the declaration of the inventor was signed by him, and that the contents thereof are true..

VIII. If any person shall wilfully and corruptly make a false declaration under this Act he shall be deemed guilty of perjury, proceeded against, and upon conviction punished accordingly.

IX. "No specification shall be filed until the petitioner shall have paid all fees payable under this Act, including the fees (if any) of the person or persons to whom the petition shall have been referred for inquiry and report."

X. At the time of delivering the specification the petitioner shall cause to be delivered to the said Secretary five copies thereof, of which one shall be sent to the Government of Bengal; one to the Government of Fort St. George; one to the Government of Bombay; one to the Government of the North-Western Provinces; and one shall be open at all reasonable times at the office of each of the Secretaries of these Governments to public inspection upon payment of a fee of one rupee.

XI. A book shall be kept in the office of the Secretary to the Government of India, wherein shall be entered and recorded every such petition and specification, and every order made upon such petition, or relating to the invention therein mentioned.

XII. Such book, or a copy thereof, shall be open at all convenient times for the inspection of any person upon payment of a fee of one rupee; and the Secretary shall cause a copy of any entry therein, certified under his hand, to be given to any person requiring the same on payment of the expense of copying.

XIII. Every such certified copy shall be *primâ facie* evidence of the document of which it purports to be a copy.

XIV. "No person shall be entitled to any exclusive privilege under the provisions of this Act—

"If the invention is of no utility, or

"If the invention, at the time of presenting the petition for leave to file the specification, was not a new invention within the meaning of this Act, or

"If the petitioner is not the inventor thereof, or

"If the specification filed does not particularly describe and ascertain the nature of the invention and in what manner the same is to be performed."

XV. "Every exclusive privilege under this Act shall cease if the Governor-General of India in Council shall declare that the same, or the mode in which it is exercised, is mischievous to the State, or generally prejudicial to the public; or if a breach of any special condition on which the petitioner shall be authorized to file a specification, or upon which the term of the exclusive privilege shall be extended, shall be proved to the satisfaction of any of Her Majesty's Courts of Judicature, and if the Governor-General of India shall thereupon declare that such exclusive privilege shall cease."

XVI. "The importer into India of a new invention shall not be deemed an inventor within the meaning of this Act, unless he be the actual inventor."

XVII. "A foreigner, whether resident abroad or not, may petition for leave to file a specification under this Act."

XVIII. "An invention shall be deemed a new invention within the meaning of this Act, if it shall not, before the time of applying for leave to file the specification, have been publicly used in India, or in any part of the United Kingdom of Great Britain and Ireland, or been made publicly known in any part of India or of the United Kingdom by means of a publication, either printed or written, or partly printed and

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* *Form of Declaration.*—I (here insert name, addition, and place of residence) do solemnly and sincerely declare that I am in possession of an invention for (state the title of the invention as in the petition); that I believe the said invention will be of public utility; that I am the inventor thereof (or, as the case may be, the assignee or executor or administrator of the inventor); and that the same is not publicly known or used in India or in any part of the United Kingdom of Great Britain and Ireland to the best of my knowledge and belief; and that, to the best of my knowledge and belief, my said invention is truly described in my petition for leave to file a specification thereof.

(Signed)

partly written. The public use or knowledge of an invention, prior to the application for leave to file a specification, shall not be deemed a public use or knowledge within the meaning of this section, if the knowledge shall have been obtained surreptitiously or in fraud of the actual inventor, or shall have been communicated to the public in fraud of the actual inventor or in breach of confidence: provided the inventor shall, within six calendar months after the commencement of such public use, apply for leave to file his specification, and shall not previously have acquiesced in such public use: provided also that the use of an invention in public by the actual inventor thereof, or by his servants or agents, or by any other person by his license in writing, shall not be deemed a public use thereof within the meaning of this Act."

XIX. If an actual inventor who, prior to the time of applying for leave to file a specification of an invention under this Act, shall have obtained Her Majesty's letters patent for such invention in the United Kingdom, shall, within twelve months from the passing of this Act, or within twelve months from the date of such letters patent, petition the Governor-General of India in Council for leave to file a specification of such invention, the invention shall be deemed a new invention within the meaning of this Act, if it was not publicly known or used in India at the date of the petition for such letters patent, notwithstanding it may have been publicly known or used in India before the time of his petitioning. But the exclusive privilege in India shall not extend beyond the term of the said letters patent, unless the same shall be renewed, in which case the exclusive privilege may be renewed under this Act for the extended term.

XX. No exclusive privilege obtained under this Act shall entitle the owner to exclude any person from using the invention, who, prior to the 7th July, 1855, used the same in India.

XXI. An action may be maintained by an inventor against any person who, during the continuance of any exclusive privilege granted by this Act, shall, without the license of the said inventor, make, use, sell or put in practice the said invention, or who shall counterfeit or imitate the same.

XXII. No such action shall be defended upon the ground of any defect or insufficiency of the specification of the invention; nor upon the ground of a misdescription of the invention in the petition; nor upon the ground that the plaintiff was not the inventor, unless the defendant shall show that he is the actual inventor, or has obtained a right from him to use the invention either wholly or in part. But the actual use of an invention in India or the United Kingdom before the date of the petition may be a defence to such action.

XXIII. "It shall be lawful for any person to apply by motion to any of Her Majesty's courts of judicature for a rule to show cause why the Court should not declare that an exclusive privilege in respect of an invention has not been acquired under the provisions of this Act by reason of all or any of the objections following:"—

That the said invention is of no utility, or

That it was not, at the time of presenting the petition for leave to file the specification, a new invention within the meaning of this Act, or

That the petitioner was not the inventor thereof, and, in addition thereto, either that the applicant was the inventor, or that he has obtained a right from the inventor to use the said invention either wholly or in part, or that the inventor has dedicated or made known the invention to the public, or has acquiesced in the public use thereof, or

That the specification filed does not particularly describe and ascertain the nature of the invention, or in what manner the same is to be performed, or

That the petitioner has knowingly or fraudulently included in the petition or specification, as part of his invention, something which was not new, or whereof he was not the inventor, or

That the petitioner has wilfully made a false statement in his petition, or

That some part of the invention, or the manner in which that part is to be performed as described in the said specification, is not thereby sufficiently described and ascertained, and that such defect or insufficiency was fraudulent and is injurious to the public.

XXIV. Any person may, in like manner, apply to any of Her Majesty's courts of judicature for a similar rule in respect *of any part of the invention* to be specified by reason of all or any of the objections following:—

That such part of the invention is wholly distinct from the other part thereof and is of no utility, or

That such part was not, at the date of the petition, a new invention within the meaning of this Act, or

That the petitioner was not the inventor of that part of the invention, and in addition thereto, either that the applicant was the inventor of that part, or that he has obtained a right from the inventor to use it, or that the inventor has dedicated or made

known the same to the public or has acquiesced in the public use thereof, or

That that part of the invention, and the manner in which it is to be performed, is not sufficiently described and ascertained in the specification, and that such defect or insufficiency is injurious to the public.

XXV. It shall be lawful for the Advocate-General of the East India Company at any of the Presidencies, or any other person, by order of the Governor-General in Council, to apply to any of the Courts of Judicature for a rule calling upon the petitioner to show cause why the question of the breach of any special condition upon which the leave to file a specification has been granted, or any other question of fact on which the revocation of the exclusive privilege by the Governor-General in Council under the power herein before reserved may depend, should not be tried in the form of an issue directed by the said Court; and if the rule be made absolute, the Court—unless the breach or other matter of fact be admitted—may thereupon direct such issue to be tried, and certify the result of such trial to the Governor-General in Council. The costs shall be in the discretion of the Court.

XXVI. Notice of any rule obtained or proceeding taken under either of the last three preceding sections shall be served on all persons appearing to be proprietors or to have shares or interests in the exclusive privilegeunder the provisions of section xxiv. of this Act, and it shall not be necessary to serve such notice on any other persons.

XXVII. and XXVIII. These clauses relate to purely legal proceedings.

XXIX. If the Court shall think that the petitioner has, in the description of his invention in the petition or specification, included something which at the date of the petition was not new, or whereof he was not the inventor, or that the specification is in any particular defective or insufficient, but that the error, defect, or insufficiency was not fraudulently intended, the Court may order the specification to be amended. No amended specification shall have the effect of enlarging the exclusive privilege before acquired.

XXX. An exclusive privilege shall not be defeated upon the ground that there is any misdescription of the invention in the petition, unless such misdescription was fraudulent.

XXXI. Whenever it shall be adjudged by any of the said courts of judicature that an exclusive privilege has not been acquired, the Secretary to the Government of India shall cause an entry thereof to be made in the book hereinbefore directed to be kept.

XXXII. If, upon proceedings instituted within two years from the date of a petition to file a specification, the actual inventor shall prove that the petitioner was not the actual inventor, and that at the time of the petition he knew that the knowledge of the invention was obtained by himself or by some other person surreptitiously, the Court may compel the petitioner to assign to the actual inventor any exclusive privilege obtained under this Act, and to account for and pay over the profits thereof.

XXXIII. This clause relates to the mode in which effect is to be given to the preceding one.

XXXIV. A book shall be kept in the office of the Secretary to the Government of India in the Home Department (such book to be open to inspection without fee) wherein every person filing a specification under this Act shall cause to be stated, under a number corresponding with the number of the specification, some place in India where service of any rule or proceedings for the purpose of cancelling or revoking his exclusive privilege may be made. All proprietors of, or persons having interests in, such exclusive privilege shall also cause their names, &c., to be similarly entered.

XXXV. Act VI. of 1856 shall be of the same force and effect in respect to every petition and specification filed under the provisions thereof before the Act was repealed, and for the purpose of everything done under that Act while it continued in force as if previously to the passing of the said Act the sanction of Her Majesty to the passing thereof had been obtained and signified in pursuance of the Statute passed in the seventeenth year of the reign of Her Majesty, entitled, "An Act to provide for the Government of India," and as if the said Act had not been repealed; save only that the term of fourteen years shall be computed from the time of the passing of this Act, instead of from the time of filing the specification, and that no exclusive privilege shall cease to have effect by virtue of the provisions of section xvi. of the previous Act if the invention be put in practice in India within the period of two years from the time of the passing of this Act.

XXXVI. "Every petition for leave to file a specification under the provisions of this Act, or for the extension of the term of an exclusive privilege, shall be written or printed on stamped paper of the value of *one hundred rupees*."

XXXVII. In the construction of this Act, the following words and expressions shall have the meanings hereby assigned to

them, unless there be something in the subject or context repugnant to such construction:—

The word "invention" shall include an improvement.

The word "manufacture" shall be deemed to include "any art, process, or manner of producing, preparing, or making an article, and also any article prepared or produced by manufacture."

The words "inventor" and "actual inventor" shall include the executors, administrators, or assigns of an inventor, or actual inventor, as the case may be.

The word "India" shall mean the territories for the time being in the possession and under the Government of the East India Company.

ROAD PAVING.

To the Editors of the Mechanics' Magazine.

Gentlemen,—A letter under this head appeared in your last valuable Number, from Mr. Holland, of Woolwich, recommending alternate rows of stone and wood as affording a good foothold for horses, and constituting a most valuable improvement in street paving.

Your correspondent will find his sensible suggestions carried out in some paving I recently laid down at the Holborn end of Little Queen-street, by the authority of the District Board of Works.

This improved system has been in operation for some years, and I am enabled to state that it not only affords a good foothold to horses, but it possesses the other valuable advantages of freedom from mud, dust, and noise, and, being cast in blocks of large dimensions, affords great facility for access to the water and gas mains.

I remain, Gentlemen,

Your obedient servant,

Fred. Braithwaite.

46, Berners-street, June 9, 1858.

[We cannot allow the above letter to pass without adding a few words respecting the paving which our experienced correspondent here brings to our notice, especially as he is eminently well qualified to pronounce an opinion upon the subject, having acted as a Member of the Council of the Institution of Civil Engineers for many years, and as a Commissioner for a large London paving district in St. Pancras. The patent composite paving referred to by Mr. Braithwaite is a composition of creosoted wood and broken Guernsey granite, cemented together in alternate rows with mineral asphalte, and cast into blocks 24 ins. in length by 15 wide and 8 deep. They may, however, be moulded into any other shape or size, and may be entirely composed of broken granite, as some of the blocks in Little Queen-street now are, for the satisfaction of those Commissioners who have an objection to wood in any shape or form. It has been found, nevertheless, that, however objectionable wood in its natural state is admitted to be as a material for paving by itself, its introduction in conjunction with these blocks, when rendered impervious to water by creosote, constitutes a very valuable feature in the improved system. The blocks, when laid down to a proper curve, and when their joints have been run in with asphalte, form an arch capable of sustaining the heaviest traffic; and being impervious to water, provide most effectually against noxious emanations from gas mains and putrid sewers, by which the inhabitants of the metropolis have been of late so frequently afflicted. The blocks can be taken up to get at gas and water mains, and relaid with greater facility than any others now in use, and they never can sink into ruts as the narrow granite blocks recently introduced frequently do, when acted on by waggon-wheels.

In a report made on the 10th of May to the Commissioners of the Holborn Board of Works, Mr. Braithwaite speaks very highly of the composite paving, pronouncing it superior to every other paving material that has come under his notice, and entering at considerable length into a statement of its advantages. After adverting to its general excellence, he says:— "The substitution of machinery for manual labour in the manufacture of these composite blocks is another feature which I find very important in an economical point of view, as a given number of square yards of this paving can be prepared and laid down in as many hours as days are now required for granite blocks." He then contrasts the new system with that of Macadam, and asserts that the former gets rid of many of the evils of the latter, adding:—"The most satisfactory evidence that can be adduced in support of this fact is that of a specimen of this (the new) system which I have seen in a coal merchant's yard at Greenwich, where it has been for upwards of three years exposed to the heaviest traffic without requiring any repairs, while the adjoining Macadam required to be renewed every two or three months, in order to keep it on a level with these composite blocks; and I can also advert to the specimen laid down

in Southampton-street, where similar frequent renewals of the Macadam were required, and where, notwithstanding the Pickford vans and other heavy traffic proceeding along this street from Holborn to the Euston-square Railway Station, including during a portion of that time the whole of the traffic of Holborn itself, while that great thoroughfare was being repaved. I could not discover on measuring these blocks that there was a greater reduction in any of them by this wear and tear than from an eighth to a quarter of an inch, nor any symptom of a rut or hollow on the surface of any of them. . . . . . . Another advantage to rate-payers, as well as to inhabitants, in an economical as in a sanitary point of view, must be obvious from the material diminution of such nuisances as mud, dust, and watering carts."

We have been induced to extend these remarks thus far, because during the last week or two the obstructions occasioned by the renewing of the common street paving have been so great in some of the most crowded thoroughfares of the city that a satisfactory method of reducing the evil thus occasioned deserves the utmost encouragement.—Eds. M. M.]

PULVERMACHER'S MEDICAL GALVANIC CHAINS.

Mr. Pulvermacher, of Oxford-street, whose medical galvanic chains are highly esteemed both here and in France, has recently patented further and highly ingenious improvements in these articles, his object being to produce constant batteries with the aid of a single exciting liquid. This new invention consists,—1st, in an arrangement of electro-magnetic apparatus for producing induced currents. Inside the coil of copper wires he carries down numerous small iron wires, and bends them up back again to the top of the apparatus, one-half over the outside of the coil of copper wire on one side, and the other half outside the coil on the opposite side, and then unites them to a bar of soft iron, the outer ends of which are connected to coil springs outside the apparatus, in order that to and fro motion of the bar may be obtained by the interruption of the circuit. 2. He produces a constant and energetic current in batteries without the employment of any acid by the use of positive metal, for instance zinc, and carbon, or other negative body, and a solntion of bichromate of potassa, bisulphate of potassa, and sea salt. And he finds it very advantageous to construct batteries in such manner that the atmospheric air may act upon the metal and exciting liquid simultaneously. For portable flexible batteries he takes a foundation of gutta-percha, in the form of a strip or band, and perforates it at intervals of, say, half an inch; he then winds wires around it into separate elements, and unites the whole into one battery. Or he weaves copper and zinc wires with a non-metallic or textile warp, divides the fabric thus composed into separate elements, and unites the whole to form a battery. Or he prints upon a textile material with an adhesive composition, and covers it with metal leaf or foil, or powders thereon metal in filings or powder, and, by pressure, obtains a metal surface. He next prints a corresponding form in adhesive composition, and covers it with metal leaf or foil, or powders it over with metal electrically positive or negative to that previously mentioned, and by pressure obtains a metal surface. Or he takes a positive metal, say zinc plate, and forms parallel slits therein, and presses out every piece between two slits on one side and then on the other side alternately, whereby a cage or holder is formed; he then inserts a small and negative plate, say copper, similarly formed, but smaller, to allow of the pieces of copper coming into the spaces between the pieces of zinc without touching them; he thus obtains a large surface in a very small compass. These batteries may be excited by being dipped in an exciting liquid and then withdrawn, or by being supplied by capillary attraction through some porous body.

Safety Railway Indicator.—M. Regnault, one of the chief functionaries of the Western Railway, has invented a new indicator for announcing the departure of trains at the different stations along a railway line. The apparatus consists in a dial-plate, with a hand which may move right or left, according to the direction in which the train is to start. The stationmaster at the terminus from which the departure takes place has only to press with his finger on a knob with which the dial-plate is provided to make all the apparatuses of the same kind along the line mark the departure; the hands remain in the same situation even when the communication is interrupted, and (this is the most important point), should an inattentive stationmaster press on the knob of his indicator while the hand marks the impending arrival of a train, the hand will not obey this wrong impulse, but remain where it is, and thus call the stationmaster's attention to the mistake he was about to commit.—Paris Correspondent of the *Times.*

MISMANAGEMENT OF THE GOVERNMENT WORKS AT WOOLWICH.

The following paragraph, taken from the *Times* of Monday, the 14th inst., speaks for itself:—"One of the members of the Royal Commission went down to Woolwich on Saturday last, and instituted inquiries relative to certain departments of the Royal Arsenal at Woolwich. Notwithstanding the length of time which has elapsed since the Royal Standard Gun Foundry was completed, at a cost regardless of amount, not one serviceable gun has been turned out and passed the ordinary proof, although a guarantee was given to the Secretary of State for the production of 250 guns from that foundry by the 31st of March past. The important blunder, it is understood, lay in the utter absence of practical men to direct the working of the establishment, the nominal and responsible founder being an artillery officer, and the subordinate foremen or sub-directors (who should be well up to the work of gun casting) being mere novices in that class of duty, having passed their lives as engineers' workmen and cylinder casters, and being, therefore, unacquainted with the proper fusion of the metals requisite for making good and durable iron ordnance. The Royal Laboratory is likewise about to undergo investigation, it having been stated on official authority that, in spite of the large expenditure and cost of that establishment, the British Government is not in possession of a single species of shell adapted to present use. The enormous sums claimed by that department for the expenses of the late peace rejoicings in Hyde Park are also about to be rigidly inquired into. It is stated that the cost of the fireworks alone amounted to upwards of 100,000*l.*, and that the surplus, buried and destroyed at times in Woolwich marsh, is inconceivable."

The present Government could not do a better or more righteous act than that of bringing the offenders in this matter to justice, and thus putting an end to that baneful system of irresponsibility which has been fostered for years past by successive Whig Governments.

GREAT INDIA SUBMARINE TELEGRAPH.—The prospectus has been issued of the Great India Submarine Telegraph Company, with a capital of 1,000,000*l.* in 20*l.* shares. The proposal is to construct a line on Mr. Allan's patent from Falmouth to Bombay, *via* Gibraltar, Malta, and Alexandria, and thence by the Red Sea to Aden and Bombay. Mr. Allan contends that his system confers the advantage of an economy of 40 per cent. in the first cost of construction, and of more than 50 per cent. in the working.—*Times.*

SCOTT'S GUTTA-PERCHA BOOTS AND SHOES.

The very moderate price at which gutta-percha soled boots and shoes can be produced has induced many attempts to overcome the difficulties and defects attending this application of gutta-percha. The greatest and only important difficulty encountered by the boot and shoe manufacturer is in attaching the gutta-percha sole to the leather "upper" and to the "insole." What is known as "gutta-percha solution" is generally used to cement the sole to the upper and insole, but, if there is the slightest grease on the surface of the leather, the cement will not adhere. The leather is, during its manufacture, necessarily dressed or treated with oil or grease to render it pliable and to prevent its becoming hard and cracking; and although its surface is well scraped and cleaned before attaching the gutta-percha sole, the grease contained in the pores of the leather gradually works its way to the surface, and causes the cement to lose its hold. When a slight separation occurs at any point, it very rapidly spreads, from the working of the shoe in walking, and the sole soon becomes entirely detached. The difficulty thus explained appears to be altogether removed by a very simple and ingenious contrivance, invented by Mr. E. Scott, of Jamaica-street, Glasgow. On examining a shoe made according to Mr. Scott's system, and on taking a section through the sole, insole, and upper, the gutta-percha is seen to be formed with a series of small screw-shaped projections, which are inserted into corresponding screw-shaped holes in the insole and upper. So solidly and firmly united are the parts, that Mr. Scott undertakes to give a new pair of boots or shoes in exchange for any made by him on this plan from which the sole may have become separated before being entirely worn away. In attaching the gutta-percha soles in this way, the screw-shaped perforations are formed in the upper and insole, upon which the sole is pressed by means of a mould, and the gutta-percha, being in a warm, soft state is forced into the perforations, and becomes tough and hard on cooling, so as to render it impossible to separate the sole. The perforations in the insole and upper may be of various forms. A very firm attachment is obtained by means of cylindrical holes, but it is obviously better to shape them so as to give a dovetail form to the gutta-percha forced into them. Mr. Scott's invention has been provisionally protected.

THE COMING ECLIPSE OF THE SUN.

The following copy of a communication from the Admiralty to the senior naval officer on the coast of Brazil, relative to the total eclipse of the sun, which will be visible in South America on the 7th of September next, has been forwarded to the *Athenæum* by the Secretary of the Royal Society:—

"Admiralty, May 1.

"Sir,—I am commanded by my Lords Commissioners of the Admiralty to acquaint you that as the total eclipse of the sun, on the 7th of September next (not visible in Europe), will be visible on the coast of Brazil, and as the accurate observation of such eclipses may prove of high scientific interest, their Lordships are desirous that a passage in one of Her Majesty's ships from Rio de Janeiro to St. Paul's may be afforded to any English astromer who may go to Brazil, for the purpose of making such observations, provided the exigencies of the service will admit of a steam-vessel being employed for the purpose. The astronomer may arrive at Rio de Janeiro in August next, and the steamer should convey him with his instruments to St. Paul's or St. Catherine's, or to such other part of the coast as may be most convenient; he should be afforded every assistance and facility for landing and erecting his instruments; and after his observations are completed, the vessel should take him back to Rio de Janeiro.

(Signed) "H. Corry.

"The Senior Officer of Her Majesty's Ships and Vessels, Rio Janeiro."

THE STEAMER "ADMIRAL."

This steamer has been built by Mr. James R. Napier, for a Riga company, to ply between Riga and St. Petersburgh, and more than ordinary importance attaches to her trial, which took place on Friday last. The ordinary practice of building steamers to specifications, binding the builder down to precise measurements and proportions, whilst the risk as regards speed and consumption of fuel is borne by the purchasers or owners, has been departed from in this instance, and with undoubted advantages to both parties. On undertaking to build the *Admiral*, Mr. Napier guaranteed that she should have certain accommodation, capacity for cargo, draught of water, speed, and consumption of fuel. A report made by Professor W. J. Macquorn Rankine, for the owners, shows that the conditions have been fulfilled. Nothing could be more satisfactory than the results obtained. The owners have what they bargained for, with full measure, whilst Mr. Napier is not giving away materially more than he is paid for. The nearness with which results have verified the calculations made, is something wonderful, and yet in these calculations so little margin was left that, if a deficiency had occurred in any one of the elements necessary to the vessel's success, every other element would have been thrown wrong. The engines are patented by Messrs. Randolph, Elder, and Co. The machinery worked with remarkable smoothness, and the concussion or tremor produced by the action of the paddles was unusually slight. The ship is modelled on a modification of the "wave line theory," and her bows are carried up almost vertically from the waterline, whilst her stern is much less overhung than is usual, so that her external appearance is very novel and striking.

THE ROYAL COLOSSEUM.

It is not often that we find it convenient to notice the public entertainments of London, but we cannot refrain from mentioning, with much approbation, the attractive exhibitions now presented at the Royal Colosseum, under the spirited and judicious management of Dr. Bachhoffner, F.C.S. Apart from the magic, clairvoyance, and other mysteries which are well calculated to amuse the multitude, and apart also from the lucid scientific lectures which the Doctor himself delivers, we desire to express our unqualified admiration of the truly magnificent diorama of Paris by Night, now to be seen there. This view alone is worth much more than the fee which admits the visitor to the whole series of entertainments, including the great diorama of Lisbon before and after the earthquake, the conservatories and classic ruins, the Swiss cottage and mountain torrent, and the stalactite caverns of Adelsburg. We know of no public place in London where an evening can be spent more agreeably—particularly in this hot season—than amid the cool and changeful scenes of the Royal Colosseum.

Whitworth's Polygonal Rifle Cannon.—We have learned that in the notice of Mr. Whitworth's experiments at Shoeburyness with his rifled cannon, as given in No. 1815, May 22d, some of the facts were not correctly stated. The experiments were merely preliminary, and the gun, which had not been proved or previously tried in any way, was fired at too great an elevation for the powder and weight of projectile with which it was charged. The precise results could not be ascertained, as the shot went so deep into the sand that they could not be found.

INSTANTANEOUS PHOTOGRAPHY.

A very important step in photographic science has lately been taken by T. Skaife, Esq., an artist of eminence, of Blackheath. We have been favoured with a view of several stereoscopic pictures taken from steamers in rapid motion, and from open boats, and were astonished at their excellence. These pictures were taken indifferently, in summer and winter, by means of a camera fitted with Mr. Skaife's patent spring shutters, and his patent dart movement, which supersedes the necessity of employing a camera stand in taking a view. In addition to the pictures above-named, we have also seen a stereoscopic photograph taken by Mr. Skaife during the practice-firing of shrapnell shells at Plumstead marshes, by the Royal Artillery, under Colonel Maude, on the 1st of June, in which the shell itself is shown in the act of bursting. These results are unquestionably of a remarkable character, and appear to us to open the way to nautical and military experiments of the highest importance.

FLOATING BUOYS, BEACONS, ETC.

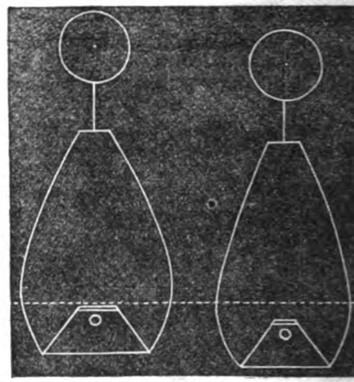
To the Editors of the Mechanics' Magazine.

Gentlemen,—Having had considerable experience in the manufacture of buoys, beacons, &c., I have read with very great interest the letters that recently appeared in your valuable Magazine, and will, with your permission, offer a few remarks upon the subject.

In the first place, I will state what are, in my opinion, the properties of a good buoy or beacon. It should draw but little water; it should carry a good-sized globe or other signal; should be as free as possible from oscillation; and, if by any chance it is thrown on its side, it should be self-righting.

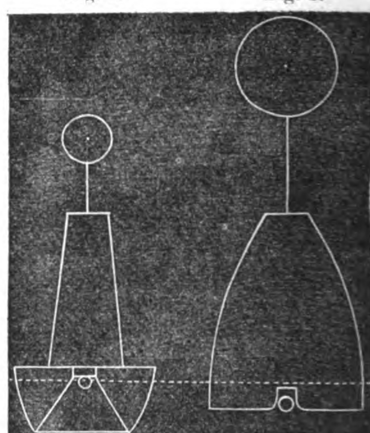
There are three sorts of hollow-bottom buoys now afloat—those made originally by Messrs. Brown, Lenox, and Co., as in Fig. 1; those altered from egg-bottoms, as in Fig. 2; and those designed by Mr. Herbert, Fig. 3. All the buoys designed by Messrs. Lenox and Co. are moored as near as possible at the point where the line of resultant forces of the water intersects the vertical axis, although I have found from practice that a few inches either way will make no perceptible difference. In Mr. Lenox's bell buoy, lately tried in the river. and illustrated in No. 1807 of your Magazine, it is considerably lower; yet the buoy sat perfectly upright, although carrying a bell upwards of 2 cwt., the hammers, staff, globe, &c., being above 2 cwt. more. I have watched the motion of these hollow-bottom buoys from the swell of the river up to the sea on the Goodwin Sands, but I do not think I ever saw those like Fig. 1 heel over 5 degrees. Those like Fig. 2, from

Fig. 1. Fig. 2.



their narrow base, I have no doubt would heel over quite 10 degrees. Fig. 3, Mr.

Fig. 3. Fig. 4.



Herbert's beacon, is made so that it is moored at the line of flotation; and the one mentioned by Mr. Findlay at the Society of of Arts had a quantity of ballast—a thing that never should be applied, as ballast will have a tendency to shift when the buoy is knocking about in a heavy sea. Again, it is not so safe as the others. If once thrown on its side, it will not right itself unless it has a large quantity of chain hanging to it, its small columnar top having a tendency to keep it down. I do not think it will ever be found as efficient as Fig. 1, and certainly will never supersede the present light-ships.

I will now call your attention to a new shape, Fig. 4, lately introduced by Messrs. Lenox and Co. This buoy was designed in consequence of the weight and expense of the others—it being much lighter and cheaper. An 8 ft. buoy of this shape has been made, and tried in the river Thames, and found to answer most admirably. It only drew 1 ft. 3 in. water with 10 fathoms of 1¼ in. chain attached. Showing as large out of water as a 9 ft. Herbert, and carrying a larger globe, it would be seen much further. It was placed at the East Oaze about the middle of last month, by the Honourable Trinity Corporation, to thoroughly test its properties in a sea way. Well knowing your desire to give your readers the best information, and considering that practical information is better than theoretical consideration, I beg to subscribe myself,

Yours very respectfully,

W. R.

Millwall, June 1, 1858.

DUKE'S PATENT PUMP MACHINERY.

Gentlemen,—The arrangement of machinery for working ship's pumps, patented by Mr. Duke, and illustrated in your Number for the 5th inst., is by no means a new one. I have frequently proposed it in conversation with shipwrights and engineers, not as an idea of my own, but from having heard that it was put into successful practice by Mr. R. Trevethick (a man not quite unknown to fame) when on a voyage to South America some 30 or 40 years ago.

Mr. D. must not understand me to suspect him of pirating the idea; I can well believe it to be original with him, and only ask him and your readers to consider this as one proof, that "*there is no new thing under the sun.*"

There are some points in the arrangement that I fancy are open to objection, but fearful of trespassing upon you, I refrain from naming them,

Remaining, yours very repectfully,

J. B. Stevens.

Wigan, June 8, 1858.

To the Editors of the Mechanics' Magazine.

Gentlemen, — The syphon, the fly-wheel, and the pendulum have ever been sad stumbling-blocks to tyros in science. The seemingly paradoxical characters of these agents have led to continual misapplications of their powers, furnishing most apt illustrations of the hackneyed aphorism that "a little learning is a dangerous thing." The earliest volumes of the *Mechanics' Magazine* contain the lucubrations of a Mr. Vallance, who proposed to employ the pendulum in aid of manual labour in various ways—for sawing, churning, pumping, &c.

The present volume (page 530) contains a description of a method of working ships' pumps, for which a Mr. Duke has taken out a patent, consisting in the application of an oscillating weight to work the pumps, "whereby the manual labour required to work them" is said to be "materially assisted."

Mr. Duke may depend upon it that this is a mistake. Instead of the labour required being *diminished*, it will be *increased* by the exact quantity required to keep the pendulous hundred-weight in motion. Mr. Duke says, "The motion of the ship will greatly facilitate the oscillations of the weighted lever, so that but comparatively small power is required to be applied to the pumps by hand." The motion of the ship has long since been made to work the pumps through the medium of a pendulum, but the motion of the ship and manual labour can never be used together. In the fifteenth volume of the *Mechanics' Magazine*, page 284, there is a description of the method of working ships' pumps by a pendulum as used in 1814, and explaining the circumstances under which this plan can be advantageously resorted to, and in what cases it is useless.

In taking out a patent for his mode of working pumps, Mr. Duke has patented a positive absurdity, inasmuch as there is nothing either new or practical in any phase of his invention.

I remain, Gentlemen,

Yours, respectfully,

Wm. Baddeley.

13, Angel-terrace, Islington,
June 11, 1858.

Attempted Infringement of Macfarlane's Patent for Moulding Pipes.—The paragraph which appeared in our last number, taken from the *North British Daily Mail*, has been contradicted. Mr. E. Hunt says, on behalf of Messrs. Steven, Reid, and Frew, the applicants for the patent:—"The extraordinary, premature, and erroneous, if not calumnious, statements in the article will be fully refuted as soon as full particulars are to hand." To this Mr. Macfarlane replies by quoting his patent agent's letter, to the effect that the portion of the applicant's invention to which Mr. Macfarlane objected was really cut out by the Solicitor-General.

"SHELLS WARRANTED TO EXPLODE ON STRIKING THE OBJECT."

GENTLEMEN,—In a former letter I explained the nature of my elongated rifle shell for carrying liquid fire; I now wish to state that, as rifles of a large calibre are not as yet much in use, an elongated shell, charged with the liquid, may be discharged from smooth-bore guns, even from cannon. The shock on the shell on firing a gun is not so *sudden* or so crushing as the shock the shell receives on striking a ship's side. If you press an egg lengthways with all your force between your hands you cannot break it; but if you press it on its sides it instantly breaks. An elongated shell, fired from a smooth bore, is not so accurate in its flight as when discharged from a rifle; but, at short distances, such as when broadsides are delivered, the shell, striking sideways, would be crushed on striking a ship's hull and innoculate her timbers with the liquid. I have been partly prompted to consider this subject from having seen, some sixteen years ago, a vignette on the cover of Hood's *Comical*, representing a basket of eggs, with a number of officers inspecting them, and having the inscription—

"Shells warranted to explode on striking the object."

I am, Gentlemen, yours, &c.,
J. NORTON.

Rosherville, June 14, 1858.

SELF-MOVING MACHINERY.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I observe that one of your correspondents, who subscribes himself "J. A. Davies," like so many others, is not a little sceptical on the subject of what is commonly termed "perpetual motion," and, besides delivering a lecture to the world at large in your last number, has brushed-up a well-worn suit of arguments for my own especial wear.

Now, admitting fully the conventional truth of these arguments, still, facts are stubborn things, and I would remind your readers, with your kind permission, that, when I was induced some little time back through the same medium to call public attention to the invention of Mr. Chenhall, then, and still, displayed in Drake-street, Plymouth, I pointed to facts only.

I, moreover, disavowed any interest whatever in the affair, as well as all knowledge of the secret principle with which the inventor has, to all appearance, endowed his clock with "perpetual motion," according to the common acceptation of the term. I may further add, as far as my own interest is concerned, that I care but little whether this long-vexed theory still lie buried, like many a hidden rock, fathoms deep, for which successive generations of scientific navigators have sounded in vain,—whether by some powerful action it be thrown up sufficiently near the surface for men like poor Mr. Spense, in 1818, to knock their heads against, or just high enough above water for *gulls* to roost upon,—or, whether by the aid of science it be destined some day or the other to be carried to such a height whereon to build our human habitations with safety;—it is altogether out of my line.

But I really would suggest the propriety of scientific men like Mr. Davies, who are curious on the matter, and, I have no doubt, thorough masters of the subject, to take a run down to Plymouth, if they can find time, and so satisfy themselves.

Thus, on the one hand, they might become the means of saving an industrious tradesman from embedding his hopes still deeper in a quicksand which has swallowed up the time and money of so many before him; while, on the other hand, if they satisfy themselves that Mr. Chenhall's pretensions are substantial, and that the inventor by his discovery has actually outraged the hitherto conventional laws of scientific decorum, and fairly capsized the coach, his judges will, I have no doubt, be generously disposed to put a poor man in the best way of turning his ingenuity to a good account.

I am, Gentlemen,
Your obedient servant,
A SUBSCRIBER.

Plymouth, June 13, 1858.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

SCOTT, U. *Improvements in boots and shoes, applicable in part to shoes for horses.* Dated Sept. 7, 1857. (No. 2336.)

This consists,—1. In using india-rubber, in combination with metal and leather, &c., in the manufacturing of soles and heels of boots and shoes, and making them elastic when the pressure of the foot is exerted upon them. 2. In making the shoes of horses in one or more parts, and placing india-rubber, &c., between the inner and outer shoe.

MACKELCAN, G. J. *Improvements in floating docks.* Dated Sept. 8, 1857. (No. 2338.)

This consists in raising ships, &c., by means of air and water-tight submerged pontoons, &c., which are inflated after being sunk.

Sharpe, B. *Improvements in electric telegraph cables, and in the apparatus used for paying-out such cables.* Dated Sept. 8, 1857. (No. 2341.)

The exterior protecting wires are here arranged longitudinally of the core, and secured by a fine wire passed round and round. These protecting wires the patentee prefers should be of copper, as more durable than iron in water. Sometimes, in place of longitudinal wires, he employs strips of metal arranged longitudinally. Sometimes he encloses the core in a single strip of metal, the edges of which are turned up and brought together, so as to surround the core; the edges being held by soldering, or otherwise. The same result may be attained by depositing on to the cable a coating of copper from a solution of that metal. In order to reduce the specific gravity of telegraph cables, he encloses them in a flexible and air-tight tubular case, somewhat larger than the cable. In paying-out telegraphic cables he causes the cable as it runs out to pass over a pulley, which is suspended from one end of a rope passing through another pulley carried by shears erected at the stern of the ship. At the other end of the rope there is a counterpoise. Sometimes in paying-out cables they foul or kink. He, therefore, passes the cable, by blocks, from end to end of the ship, and, when the cable fouls, he allows the block at the fore part of the ship to be drawn up to the stern, and so supplies a length of cable double the length of the ship, and while this length is running out time is allowed for clearing the cable. Or it may, in a similar way, be led up to a block suspended between the masts, and, when a foul takes place, this block be lowered. In either case the rope attached to the block is passed round "bits," and is slacked off, when required, by a man who has charge of that part of the arrangement. In order to prevent the end being lost in the event of the cable suddenly parting, a stopper is employed, which catches the end of the cable, and to prevent a second fracture, the stopper is allowed to be drawn over by the cable, and has attached to it a long length of rope, which is gradually checked by a break, and in the mean time the ship is stopped. By hauling in this rope the end of the cable will be recovered, and the injury may be repaired.

Geach, W. *Improvements in machinery for propelling vessels.* Dated Sept. 8, 1857. (No. 2344.)

The propelling machinery consists of a horizontal wheel, within a cylindrical case, which has an opening at its under side equal to about half the diameter, so that the water may rise up into the cylindrical case, from which it is driven by the float boards of the horizontal wheel through an opening at the side of the case. The cylindrical case is capable of being turned round, so as to bring the discharging opening into different positions, by which the propeller can be caused to propel the vessel forwards, or backwards, or sideways.

Bertou, L. L. H. *Improvements in the manufacture or production of ornamental wrappers or packings for fabrics or other goods.* Dated Sept. 9, 1857. (No. 2349.)

This consists in the manufacture of wrappers, covers, or envelopes, with trade marks or designs produced by pressure, and being indelible, and of a transparent nature, resembling the ordinary water mark. The process consists in laying the paper or fabric upon a metal plate having the required design engraved in relief. Over the paper or fabric he then places a copper or zinc plate, and over that again sheets of cardboard, and finally another zinc plate. The whole is then passed through an ordinary copper-plate printing machine.

Lavender, E. *An improvement in distilling products from coal.* Dated Sept. 9, 1857. (No. 2350.)

This consists in subjecting coal to the action of superheated steam in a vessel for obtaining products by distillation.

Eastwood, J., and S. Lloyd, jun. *Improvements in machinery for shearing iron and other metals.* Dated Sept. 9, 1857. (No. 2351.)

This applies chiefly to the cutting up of old iron and iron bars without being heated, and is an improvement upon an invention for which letters patent were granted to C. May, 15th April, 1856.

Lawford, H. *Improvements in the manufacture of dining tables, expanding and contracting tops, applicable to other expanding and contracting planes.* Dated Sept. 10, 1857. (No. 2353.)

The object here is, that the flaps or extra tops shall rest when not required in the plane underneath the parallel with the fixed tops, and so draw out as the slides expand to expand the plane, and to fall and contract also into the allotted space underneath the fixed tops.

Jamieson, W. *Certain improvements in looms for weaving figured fabrics.* Dated Sept. 10, 1857. (No. 2357.)

This invention cannot be described without engravings.

Fenton, J., W. Thomson, jun., and T.

SNOWDON. *Improvements in the permanent way of railways.* Dated Sept. 10, 1857. (No. 2358.)

This invention was described at p. 266 of No. 1806, Vol. 68.

CLARK, W. *Improvements in Jacquard apparatus and in the pattern surfaces of such apparatus.* (A communication.) Dated Sept. 10, 1857. (No. 2360.)

The object is to produce a substitute for ordinary cards. The patentee renders paper waterproof by a suitable preparation, and this paper is pierced like the ordinary cardboard, is continuous, and, being quite flexible, obviates any necessity for laced joints to effect continuity of the pattern. To obtain the requisite neatness of piercing he uses punches having the form of a double bevelled cutting edge. To prevent the hygrometrical action of the air, he covers the paper, either during or after its manufacture, with a waterproof coating. There are also a third and fourth part to this invention, which cannot be described without engravings.

DUNNICLIFF, J. D. *Improvements in dividing and measuring breadths of lace and other fabrics.* Dated Sept. 10, 1857. (No. 2361.)

The instruments for cutting are a few inches long, and work upon a bar the entire width of the machine. They have each a blade at one end, and a small pulley at the other, to allow them to move either to the right or left as the selvages of the breadths may determine. As the breadths are cut, they wind round a reel, after which they are taken off by rollers which run the entire width of the machine, and work near the top of two troughs, having separate divisions, one for each breadth. The work being deposited in the troughs, is drawn out by being passed over a small roller, and under another a yard in circumference. A dial-plate is fixed at one end, which gives the measure of the lace as it is passed round the swift and carding reel.

HARRISON, J. *Improvements in apparatus for producing cold by the evaporation of volatile liquids in vacuo.* Dated Sept. 10, 1857. (No. 2362.)

This consists partly in the application of a vessel similar to a tubular boiler, but having the tubes placed more closely together, for refrigerating by means of the evaporating of volatile liquids in vacuo. The invention embraces numerous modifications.

CROFTS, W. *Improvements in the manufacture of various weavings in bobbin net, or twist lace machinery.* Dated Sept. 10, 1857. (No. 2363.)

These relate to the manufacture in bobbin, net, or twist lace machinery of fabrics of the character produced in looms, by warp and shuttle alone, or interspersed with lace fabrics, plain or figured, and have for their object the so operating that various weft threads, or weft threads of different coloured material or character may be employed, and any one for a time be readily selected and laid in as weft, and then another, so as to produce variations governed by jacquard or other pattern surface.

BRUNINGHAUS, G. *Improvements in the treatment of iron ore (crude iron) for the production of iron and steel.* Dated Sept. 10, 1857. (No. 2364.)

These relate to manufacturing malleable products from crude fluid iron directly, by means of chemical re-agents (as alum, sulphate of iron, manganese, &c.).

MILLS, J. *Certain improvements in the manufacture of keys, tapered pins, split pins, and other similar articles employed in the construction of machinery.* Dated Sept. 11, 1857. (No. 2367.)

This invention consists of certain machinery which is applied, 1st, to the shaping and finishing of certain parts known in machine-making as keys, and commonly employed for securing wheels or pulleys upon shafting. 2d. To the manufacture of tapered pins. 3d. To the manufacture of split pins, which are formed of semi-circular or half-round wire bent double, the two flat surfaces or inward sides being brought together, and forming a pin with a split or division in its centre.

COLBECK, S., and W. H. *Improvements in looms.* Dated Sept. 11, 1857. (No. 2370.)

This relates to looms for the production of woollen cloth, &c., and consists in employing, in place of the cloth beam or roller upon which the cloth is wound as it is finished, bearing rollers arranged horizontally below the breast beam, the cloth being caused to pass round the lower and upper portion of the peripheries of the said bearing rollers respectively.

LUNGLEY, C. *Improved apparatus for directing, signalling, and indicating on board ships or vessels or other places.* Dated Sept. 11, 1857. (No. 2371.)

The patentee places an indicating apparatus immediately in front of the steersman, the same being constructed so that it may be worked by the person in charge at the look-out part of the ship. By a slight addition, the captain will also be enabled to see whether the helmsman is following his instructions.

FISHER, N. *Improvements in machinery combining operations in preparing land for agricultural purposes.* Dated Sept. 12, 1857. (No. 2372.)

This invention cannot be described without engravings.

WATSON, C. *An improved apparatus for curing certain bodily complaints.* Dated Sept. 12, 1857. (No. 2374.)

This relates to a peculiar form of instrument for curing certain complaints in the male organs of generation, such as spermatorrhœa, seminal weakness, or debility of the parts, and consists in the use of a silver-plated ring to be applied to the penis.

CLÖET, I. C. *Machinery or apparatus for treating and dressing rice.* Dated Sept. 12, 1857. (No. 2377.)

This consists, 1st, in the employment of cylindrical vessels arranged side by side, and provided with a communicating shaft, so as to be actuated simultaneously by cranks, and impart a reciprocating motion to a horizontal stirrer, a vertical stirrer or pestle being employed at the same time, by which a double triturating action is produced. A self-acting apparatus is used for supplying the apparatus and discharging the contents thereof, which is subsequently passed through a brush machine as heretofore. 2d. In an apparatus for steaming and glazing rice, consisting of a hopper or vessel fitted with a perforated outlet pipe through which steam is caused to pass, the flow being regulated according to the quantity of rice passed through the apparatus.

LEEMING, J. *Improvements in looms for weaving.* Dated Sept. 12, 1857. (No. 2378.)

This relates to looms for weaving plaids, checks, figures, &c., or such other fabrics as require a change of shuttles for the introduction of different colours of weft at certain determinate times or picks, and applies chiefly to patents obtained by J. C. Ramsden, 30th March, 1853, 28th Nov., 1853, and Dec. 1st, 1856, which the present patentee modifies.

GOSSAGE, W. *Improvements in the manufacture of soda and potash.* Dated Sept. 12, 1857. (No. 2379.)

This consists in decomposing soda waste by means of steam at a high temperature, so as to produce sulpharetted hydrogen and lime; also the decomposition of sulphuretted hydrogen so obtained by the action of atmospheric air, or sulphurous acid, or by other means, so as to produce free sulphur; also the conversion of such sulphuretted hydrogen into sulphurous acid by combustion, and the application of sulphurous acid so obtained to the manufacture of sulphuric acid.

WATERHOUSE, T. *Certain improvements in machinery or apparatus for applying steam and atmospheric air to actuating and governing forge and other hammers.* Dated Sept. 14, 1857. (No. 2380.)

This consists in combining the action of a steam cylinder used in directly actuating hammers with an air cylinder; the air acting in the air cylinder is regulated by valves for varying the effect upon the hammer.

MARSH, T. *An improved piston.* (A communication.) Dated Sept. 14, 1857. (No. 2381.)

The object here is to facilitate the adjustment from time to time, as it wears, of the packing of engine pistons. The head is formed of a skeleton frame, and is combined with plates and moveable stems acting on springs to thrust out steel and brass packing rings.

JENKINS, W. *Improvements in the furnaces or fire boxes for locomotive boilers to adapt them for the consumption of coal and the smoke arising therefrom.* Dated Sept. 14, 1857. (No. 2382.)

This consists, 1st, in placing a series of tubes (answering as stays) in the fire box on the tube plate side, to admit air to the fuel above the fire bars, the outside ends of these tubes having a valve arrangement to regulate the quantity of air passed through them. 2d. In a partition of iron, &c., passing across the fire box to prevent the air admitted through the tube stays from passing directly to the flue tubes of the boiler, this partition acting so as to cause the air admitted to mix with the combustible gases and ignite them. 3d. In tube stays, placed at the front part of the fire box, and also arrangements in the furnace doors for the admission of air to the fire box above the fuel, both the air tube stays and furnace doors having regulating valves. 4th. In using a jet of steam in the smoke box or chimney when the locomotive is standing, to create or increase the draught through the air tubes and fire bars.

GRAY, A. *Improvements in the picking motion of power looms.* Dated Sept. 14, 1857. (No. 2383.)

This relates, 1st, to imparting the proper motion to the picking stick or lever. 2d. To the manner in which the picking stick is carried. It is specially designed for power looms, in which the picking levers turn on centres at or near the base of the loom, and work in a plane parallel to the lathe, such plane being supposed to partake of the motion of the lathe.

LEE, D. T. *A new or improved washing machine.* Dated Sept. 14, 1857. (No. 2384.)

This consists of a washing machine, in which the articles are rubbed between two surfaces turning upon centres, and having an oscillating motion given to them.

Gray, A. *Improvements in lubricating mechanism.* Dated Sept. 15, 1857. (No. 2386.)

This comprehends the use of a tilting tube or scoop arranged to take up at intervals a determined quantity of the lubricating fluid, and drop it into a passage communicating with the surfaces to be lubricated.

Shiers, R., jun. *Improvements in the manufacture of velvets.* Dated Sept. 15, 1857. (No. 2387.)

This relates to the manufacture of silk velvets after the manner of those which are now manufactured of cotton, and consists in the use of silk threads for the warp of velvets.

Ashby, J. *Machinery for cleaning wheat and other grain or seed from smut and other injurious matters.* Dated Sept. 15, 1857. (No. 2388.)

This consists in the use of multi or many-pointed beaters acting on the grain, and crushing and driving out the smut, &c., through a circular sieve or screen, within which the beaters are driven round.

Walmsley, J., and T. Howard. *Improvements in machinery or apparatus for warping, sizeing, or dressing and winding on yarns or threads.* Dated Sept. 15, 1857. (No. 2389.)

The patentees employ an improved spring comb to guide the yarn or warp threads to the warp beam, &c., which they make elongated, instead of the circular spiral spring, departing from the circle so as to form dents or coiled teeth. They mount the comb on a frame made to expand or contract as desired by a right and left handed screw, or otherwise. They make the comb by lapping wire on a bar or mandril of a flat, oval, or wedge shape.

Grahame, T. *Improvements in grinding corn and in generating gas on inland waters.* Dated Sept. 15, 1857. (No. 2390.)

This consists in combining in a vessel a steam engine and gearing for propelling the vessel, and a flour mill to receive motion from the steam engine when the vessel is at anchor. The furnaces on board are to be arranged also to heat retorts to generate gas.

Bensen, G. J. *An improvement in drying sugar.* Dated Sept. 15, 1857. (No. 2391.)

When the sugar has been crystallised in a vacuum pan, it is run into pneumatic pans having false bottoms perforated with holes, covered with wire gauze. The bottoms of such pans are connected by pipes with iron tanks, which are kept vacuous by an air pump; by this means, when the cock on the pipe between the pneumatic pan and the tank is opened, the pressure of the atmosphere will force the syrup from the crystals of sugar, and it will flow into a vacuous tank. The sugar is then conveyed into a hot chamber, heated from 120 to 140 deg. Fah., and placed in similar pneumatic pans, the spaces under the perforated false bottoms of which are kept vacuous when at work, by which the heated air of the chamber will rush through and amongst the crystals of sugar, and dry them.

Archer, T., jun. *Improvements in machinery for cutting off and heading lengths of metal, applicable to the manufacture of rivets and other articles.* Dated Sept 15, 1857. (No. 2392.)

This consists in a combination of mechanical parts in which a moveable cutter and die are carried by a sliding plate, which is caused in succession, 1. To receive the end of the rod of metal; 2. To slide a distance and cause a length to be cut off the end of the rod, the cut end being thereby brought under a solid surface of the plate fixed to the under surface of the cross head, and there remain till the head is formed. 3. To further slide, whereas the die is removed from the position over the heading punch, and comes under a forcing pin, which passes through the fixed cross head or top of the machine, and forces the rivet out of the die. The sliding plate is then moved back by a spring to its first position.

Dumoulin, A. J. A. *Improvements in heating apparatus.* Dated Sept. 15, 1857. (No. 2393.)

This relates to apparatus for the distillation of fuel and consuming smoke, applicable to the generators of stationary and marine engines. It is in the form of a model blast furnace. Such furnaces are arranged in particular for utilising the gases generated, with this difference, that in the blast furnace the production of gas is accessory, whereas in this apparatus it is the principal aim. It cannot be described without engravings.

Robson, T. *Improvements in washing machines.* Dated Sept. 15, 1857. (No. 2394.)

A cylindrical vessel is mounted on an axis on which it rotates. The interior is divided by radial partitions parallel with the axis, dividing it into compartments. The periphery and the partitions are provided with perforations through which the water passes freely. The periphery is corrugated parallel to the axis. One end is made with hinged doors, for the introduction or removal of the articles operated upon. The cylinder is fitted in bearings in

a vessel suitable to contain the water, in which it is partially immersed, and rotates to effect the washing.

ADSHEAD, T. S., and J. PLATT. *Certain improvements in machinery for carding cotton and other fibrous materials.* Dated Sept. 16, 1857. (No. 2395.)

This consists in a mode of applying a vibrating comb or card to a working roller, to strip the surface thereof, whereby the strippings are collected on the working roller in the form of a coil.

WICKS, R. *Improvements in furnaces.* Dated Sept. 16, 1857. (No. 2397.)

This consists, 1st, in adapting a sliding bridge to the fire places of furnaces. 2. In a peculiar form of hollow fire bars, to be used in combination with an additional ash pit.

SEWARD, A. and C. *An improved boiler for heating and keeping up circulation in water.* Dated Sept. 16, 1857. (No. 2399.)

This invention was described and illustrated at p. 337 of No. 1809, Vol. 68.

LANCASTER, C. W. *An improvement in breech-loading guns and in projectiles for the same.* (A communication.) Dated Sept. 16, 1857. (No. 2400.)

This relates to improvements patented by the patentee 28th Sept., 1854. As far as regards the gun the improvement consists in forming an annular groove or recess in the rear of the barrel; the improvement in the projectile consists in placing at the back thereof a wad of felt. The effect of the explosion will be to drive back the ball at the rear of the powder, and jam the felt into the annular groove, and thus prevent any escape of gas at the rear of the barrel. This will be also found applicable to all breech-loading arms in which the escape of gas is to be prevented by forcing back a ball or projectile.

NORMANDY, A. R. L. M. DE, and E. T. SIMPSON. *Improvements in the manufacture of soap.* Dated Sept. 16, 1857. (No. 2401.)

1. The patentees first make soap by boiling fat or oil with soda ley in the ordinary manner, and having "curded" the mass allow the liquor to settle for a short time to the bottom of the soap-pan, and draw it off. They then add ley and cocoa-nut oil, and boil the whole until it has become a homogeneous, well saponified mass. They then add sulphate, sulphite, or hyposulphite of soda, and boil again, whereby they produce a mottled soap. 2. When soap is made in the usual manner they introduce hyposulphite of soda, which, like the ordinary sulphate, imparts to soap a great degree of hardness without being liable to effloresce, and, like the sulphite of that base, removes the chlorine which bleached fabrics retain.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

PARSON, G. J. and T. PILGRIM. *Improvements in the mode of generating steam in the boilers of steam-engines, and in raising the temperature of steam for other uses.* Dated Sept. 8, 1857. (No. 2339.)

This consists,—1st, in applying to the furnaces of steam boilers a continuous pipe or tier of pipes, arranged so as to form an arch over the fire, and resting on the bearing bars, such pipe or tier of pipes communicating at one end with the ordinary steam chest, and at the reverse end with the boiler for working the steam engine. 2. In the employment of the apparatus above described, without the boiler; but with any required apparatus.

MARLAND, J. *An improvement in the manufacture of cop tubes.* Dated Sept. 8, 1857. (No. 2342.)

Here, when using paper or woven fabric for the manufacture of cop tubes, the pieces of paper, &c., are cut to an angular form, cemented on one side, and are then rolled up so as to produce conical-shaped cop-tubes, thicker at their lower ends than at their upper ends, the interior of the cop-tubes being cylindrical or nearly so.

MILLER, J. M. *Surface condenser, applicable to steam-engines and other purposes.* Dated Sept. 8, 1857. (No. 2343.)

This invention refers to the arrangement and construction of the metallic surfaces for condensing steam and heating the water of condensation, by which more perfect results than heretofore obtained are said to be produced.

HOWARD, W. *Improved apparatus for supplying air, medicated or pure, to persons in confined apartments, and other places requiring ventilation.* Dated Sept. 8, 1857. (No. 2345.)

This consists in the use of an arrangement of pipes and tubes communicating with the open air, and provided with flexible branch pipes, to the ends of which are adapted mouth pieces furnished with clack valves, one of which opens inwards, and the other outwards. The inventor also makes a portable apparatus to be used by persons who enter sewers, or other places of fetid or impure atmosphere.

HOGA, S. *Improvements in apparatus for generating electricity and for transmitting electric currents from place to place.* Dated Sept. 9, 1857. (No. 2346.)

Here galvanic batteries and metallic connections are dispensed with, the electricity

being produced by a boiler resembling the hydro-electric machine, but, instead of water, mercury mixed with a little sulphur is employed.

LETOURNEL, L. *An apparatus for weighing ships' anchors.* Dated Sept. 9, 1857. (No. 2347.)

Two curved plates are held together by two bolts, and embrace the cable. Each bolt serves as a spindle for a bent lever; at the other end of which is a short chain, the free ends of the two being united, and being drawn up, the two levers act as a pair of pincers, and take the chain between them, so that the anchor may be drawn up with facility, and, if required, instantly liberated.

HEDIARD, A., and S. LEVIEUX. *An improved boiler for generating steam.* Dated Sept. 9, 1857. (No. 2348.)

This is a boiler intended to generate steam instantaneously; that is to say, the water injected into its boiler tubes is immediately transformed into steam, and raised to the highest pressure if required. The form of the boiler cannot be described without engravings.

BACON, J. B. *Improvements in machinery for manufacturing horse-shoe nails.* (A communication.) Dated Sept. 9, 1857. (No. 2352.)

To draw out from a nail rod a shape suitable for a horse-shoe nail, free from brittleness and flaws, the iron must receive a rapid succession of pressures, each lateral to the last preceding. A machine combined according to this invention will perform these actions by means of a succession of segments of rolls, the succeeding segments being placed as to their line of action at right angles to the preceding segments.

LESLIE, J. *Improvements in carding or preparing textile materials.* (A communication.) Dated Sept. 10, 1857. (No. 2354.)

This relates essentially to so arranging carding engines that the top rollers of the main cylinder or carding drum revolve at different rates.

HONEYMAN, J., jun. *Improvements in generating steam.* Dated Sept. 10, 1857. (No. 2355.)

This relates to the generation of steam by the agency of a tubular circulation through the steam boiler of highly heated water. The heating water receives its necessary high temperature from tubes arranged within heating furnaces, and these tubes are then conveyed through the boiler wherein the steam is to be raised.

MILLE, M. J. A., and F. CANAL. *Improvements in producing gas.* Dated Sept. 10, 1857. (No. 2356.)

This consists in the use of tar and other residues arising from the manufacture of gas, and other tars, and resinous or fatty materials, mixed with thin shavings, or chips, or saw dust of wood. This mixture is distilled in an ordinary gas apparatus, and the gas resulting purified by ordinary means.

HOUCHIN, R. *An improved press for punching, stamping, and embossing, or otherwise, for cutting out paper, leather, or other materials, and for fixing and closing eyelets.* Dated Sept. 10, 1857. (No. 2359.)

This consists of a tripod stand, to which are attached levers or eccentrics for giving motion to a plunger, which works in guides or bearings. To this plunger are fitted the necessary dies, cutters, or punches required for use. Immediately underneath the plunger is a seat or bed of the machine. The machine is set in motion by means of a treadle connected with the levers, and worked by the foot.

MENNONS, M. A. F. *An improved smoke-condensing apparatus.* (A communication.) Dated Sept. 11, 1857. (No. 2365.)

This consists in extracting and utilising the carbonaceous particles contained in smoke from furnaces by means of a peculiar construction of apparatus, serving to collect and immerse the same in water, by which the particles become condensed, and being afterwards withdrawn and mixed with other materials they may again be employed as fuel.

SILVER, T. *A machine or apparatus for regulating or governing the paying-out or delivery and the laying down of submarine or oceanic telegraph cable, parts of which are also applicable for taking and recording soundings, and for other purposes.* Dated Sept. 11, 1857. (No. 2366.)

The inventor proposes to pass the cable through a machine in such manner that a portion of the sheaves or pulleys round which it passes shall approach the others when the strain exceeds a given amount, thus yielding to the said strain, and preventing the fracture of the cable. An indicating apparatus is attached to the moveable parts to indicate the actual strain exerted. An atmospheric regulator or fly governor is attached to the first pulley, to control its movement.

M'CALLUM, W. P. *Improvements in machinery used for stamping or raising metals.* Dated Sept. 11, 1857. (No. 2368.)

In the cam or eccentric employed for raising the hammer the inventor introduces a joint so as to give it the power of changing its radius and curvature, and thereby raising the hammer to a greater or less height. In order to retard the fall of the

hammer, where desirable to diminish its force, he uses springs which, by pressing upon the hammer laterally during its descent, retard its motion.

SERVAN, A. M. *Improvements in the cementation of iron combined with the manufacture of coke.* Dated Sept. 11, 1857. (No. 2369.)

The cementation is effected either directly in the oven-chambers, or by annexing to the coke ovens, chambers to contain the iron. The combustible gases arising from the distillation of the coal are ignited in the cementation chambers by a current of hot air, circulating round the boxes containing the iron, and then passing below the floor of the ovens.

LAPHALEQUE, N. G. I. DE. *Improvements in violins and other stringed musical instruments of a similar nature.* Dated Sept. 12, 1857. (No. 2373.)

This consists in applying, instead of the said sound pin, a small frame, in which are inserted vanes or diaphragms fixed to a spindle, which may be moved from the outside of the instrument, in order to modify the sound of the instrument.

BUTLER, J., and J. PITTS. *An improvement in fastening tyres on wheels for railway carriages.* Dated Sept. 12, 1857. (No. 2375.)

This consists in fastening the tyre on by bolts or keys passing through slots or grooves made on the exterior of the inner rims, or upon the ends of the spokes or arms, also through a portion of the tyre of such wheels, such bolts or keys being placed parallel to the axis of the wheel.

EDWARDS, J. *Improvements in railways to facilitate locomotive engines ascending inclines.* Dated Sept. 12, 1857. (No. 2376.)

Here, there are additional or double rails laid on inclines between which the flanches of the wheels of the locomotive engines enter, and the spaces between the double rails are such as to fit the flanches tightly on either side. There are modifications included.

SLEDDON, J., and J. MARSLAND. *Improvements in preventing incrustation in steam-boilers.* Dated Sept. 14, 1857. (No. 2385.)

This consists in the use of washing rock soda, or carbonate of soda, or soda ash, or bicarbonate of soda, or of a compound of any or all of them, to be put into the water in the boiler, either as a powder or reduced to a liquid state by water.

PROVISIONAL PROTECTIONS.

Dated April 29, 1858.

958. William Smith, of Salisbury-street, Adelphi. Improvements in steam ploughs. A communication from P. Klingle.

Dated May 5, 1858.

996. Charles Dickson Archibald, of Rusland-hall, Lancaster, at present at New York, Esquire. A new and improved mode of treating air and gases, and applying the same for purposes of motive force. A communication from H. M. Paine, of Worcester, Massachussets.

Dated May 10, 1858.

1038. Robert Bruce Goldsworthy, of Manchester, emery manufacturer. Improvements in machinery for grinding emery and other materials.

Dated May 19, 1858.

1110. Giovanni Mariano Casentini, of Hercules-buildings, Lambeth, architectural modeller. The manufacture of a solution for mixing with or guaging plaster of Paris (or any plaster having sulphate of lime or any similar substance for its base), so as to produce a hard and dense composition, the hardening or setting whereof may be retarded and regulated by the person using the same.

1116. George Mackey Miller, of Dublin, engineer. Improvements in the joints of bridge rails for railways.

1118. William Edward Newton, of Chancery-lane. Improvements applicable to certain descriptions of marine engines, and in the mode of mounting paddle-wheel shafts. A communication.

1120. William Clark, of Chancery-lane. Improvements in machinery for manufacturing knotted webs or nets. A communication.

Dated May 20, 1858.

1122. James Hesford, of Bolton-le-Moors, millwright. Improvements in the construction of stretching machines for cotton and other woven fabrics.

1124. Antoine Fidelis Cossus, of Cagliari. Improvements in treating oils and fatty matters.

1126. James Copcutt, of Park-place, Kensington. An improvement in preparing materials employed to obtain light when using oxygen and hydrogen gases.

1128. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., Editor of the *Mechanics' Magazine*, and Patent Agent. A method of, and apparatus for purifying sulphuret of carbon. A communication from A. Seyferth, of Brunswick.

Dated May 21, 1858.

1132. Michael Henry, of Fleet-street. Improvements in the manufacture or preparation of ink and paper to adapt them for copying purposes, in preserving food, skins, and hides, in rendering lint, vesicatory-paper, and textile fabrics absorbent, and in treating mortar, cement, and other matters, in order to keep them in a damp state. A communication from Vasseurs and Houbigant.

1134. George Frederick Muntz, of French Walls, near Birmingham. An improvement in preparing yellow metal sheathing.

1136. Stephen Bryer, of Cheltenham, photographist. Improved instruments to be used in the sensitizing and developing of photographic plates.

Dated May 22, 1858.

1140. Pierre Féron, of Theuville-aux-Maillots, France, Doctor of Médecin. An improved bandage or truss.

1142. Edward Thomas Hughes, of Chancery-lane. Improvements in machinery or apparatus for embroidering. A communication.

1144. Joseph Foot, of Spital-square. An improvement in the manufacture of fringes.

1146. Thomas Stokes Cressey, of High-street, Homerton. Improvements in apparatus for calculating wages.

1148. Astley Paston Price, of Margate, chemist. Improvements in the treatment and smelting of certain argentiferous or silver ores.

1150. George White, of Dowgate-hill. A liquor suitable for manufacturing beverages, and for culinary purposes. A communication from Fontaine and Co., of Paris.

1152. Isham Baggs, of Doddington-grove, Kennington, electrical engineer. Improvements in electric telegraphs, and in the apparatus employed therein and therewith, parts of which are applicable to other electrical purposes.

1154. William Clark, of Chancery-lane. Improvements in machinery or apparatus for moulding articles of cement. A communication from F. Pallard, sen.

Dated May 26, 1858.

1177. Jozé Luis, of Welbeck-street, Cavendish-square. A distilling pipe. A communication.

1179. Jozé Luis, of Welbeck-street, Cavendish-square. The application and use of the fibrous textile plant, called in Arabia "Diss," or in Latin, "Arundo festuca patula," or by botanists, "festucoidés et Donax tenax," in the manufacturing of pulp for paper, and tow for thread, tissues, and cordage. A communication.

Dated May 27, 1858.

1189. Adam Cyrus Engert, of the City-road, manufacturer. A method of preparing tin foil or leaf, in order to its employment as a substitute for silver leaf. A communication.

1191. Charles Cuit, manufacturer, and Alexandre Godefroy, gentlemen, both of Paris. Improvements in railway breaks.

1193. Charles Cowper, of Southampton-buildings, Chancery-lane. Improvements in machinery for combing and preparing wool, cotton, and other fibrous materials. A communication.

1195. Vincent Louis Vodoz, of Albemarle-street. An improvement in the chimneys and glasses of gas and other lamps.

1197. Joseph Bower, of Hunslet, near Leeds, manufacturing chemist. Improvements in the manufacture of glass.

Dated May 28, 1858.

1199. Charles Stanley, of Birmingham, merchant, and Joseph Fittall, of Birmingham, warehouse clerk. Improvements in skylights and glass roofing.

1201. Marc Antoine François Mennons, of Paris. An improved key-joint for connecting detached pieces of wood or metal. A communication.

1203. Lorenzo Tindall, of Mansfield, Nottingham, iron-founder. Improvements in machinery or apparatus for sweeping and cleansing roads and streets.

1205. Auguste Godet, of Bordeaux, France. Improvements in raising weights.

1207. Erasmus Bond, of Wharf-road, City-road, mineral water manufacturer. An improved aërated liquid.

Dated May 29, 1858.

1209. Enoch Sykes, Reuben Sykes, and Philemon Sykes, all of Huddersfield. Improvements in continuous spinning and roving machines for spinning and roving wool, a part of which is applicable to spinning other fibrous substances.

1211. Alexander Dold, of Chatham, clock-maker. Improved apparatus for winding clocks, which apparatus is also applicable as a motor for all machinery usually turned by hand, horse, or other power, and for preventing the descent of smoke into chambers or other places.

1213. John Martin, of Newman-street, Oxford-street, joiner. Improvements in means or apparatus for the prevention or cure of smoky chimneys.

1215. Marc Antoine François Mennons, of Paris. An improved fumigating apparatus. A communication.

1217. Michael Henry, of Fleet-street. Improvements in, and in preparing agents for, dyeing, preparing for dyeing, and tanning, and applying certain of the resulting products for obtaining pulp for paper and pasteboard, and the manufacture of blacking. A communication from J. B. Vasseur and A. Houbigant.

Dated May 31, 1858.

1219. John Young and James Strang, of Castle Glen, Lanark, manufacturing chemists. Improvements in the manufacture of starch, gum, or dextrine, and their compounds.

1221. Jean Baptiste Girerd, of Newman-street, Oxford-street, and Paul Frederick Wohlgemuth, of New Bond-street. Improvements in ornamental staining, dyeing, and fixing designs, writing, letter-press and type printing and cyphering and colours on wood, or any other substances, also extracting, transferring, or discharging colours from the same.

1223. William Parsons, of Pratt-street, Old Lambeth, manufacturing engineer. Improvements in steam-engines, for propelling vessels and other purposes, and in bearings for the screw-shafts of steam vessels.

1225. William Edward Newton, of Chancery-lane. Improvements in printing and dyeing textile and other fabrics. A communication.

Dated June 1, 1858.

1227. Christopher Binks, of London. Improvements in manufacturing soap.

1229. Charles Fréderic Vasserot, of Essex-street, Strand. A kind of tramway to facilitate the locomotion of bedsteads. A communication from A. Gaud, of Bordeaux.

1231. Alonzo Gaylord Grant, of New York, photographic artist. An improved stand or rest for cameras, theodolites, guns, and other articles.

1233. Joseph Lang, of Garstang, Lancaster. An improved method of signalling on railways.

Dated June 2, 1858.

1235. John Mannhardt, of Munich, Bavaria. An improvement in machinery for the manufacturing of peat fit for fuel, and for the squeezing or forcing of fluids out of the said turf, peat, or similar substances.

1237. Jozé Luis, of Welbeck-street, Cavendish-square. A new description of plough, with fore-carriage applicable to all swing or common ploughs. A communication.

1239. Charles Wheatstone, of Hammersmith. Improvements in electric telegraphs, and in apparatus connected therewith.

1241. Charles Wheatstone, of Hammersmith. Improvements in electro-magnetic telegraphs, and apparatus used for transmitting signs or indications to distant places by means of electricity.

1243. Johan Ernst Fridrich Luedeke, of Marke, Hanover, engineer. Improvements in motive power engines.

PATENT APPLIED FOR WITH COMPLETE SPECIFICATION.

1264. John Henry Johnson, of Lincoln's-inn-fields. Improvements in railway wheels, and in axle-boxes and bearings for the same. A communication from W. B. Fahnestock. Dated June 4, 1858.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," June* 15, 1858.)

178. W. K. Hall. Improvements in the manufacture of artificial leather.
205. D. Smithies. Improvements in the manufacture or healds or harness for weaving.
210. C. Knight. An improved railway guide.
218. S. Williamson. Improvements in the construction and mode of affixing street and other gas lamps or lanterns.
220. L. F. Candelot. Divers anti-nitrous cements, also applicable to rendering damp surfaces impervious, and to flagging and similar purposes.
222. W. Potts. Improvements in painting upon glass, and in protecting paintings upon glass.
226. J. Miller. Improvements in machinery for the manufacture of bread. A communication.
228. F. Mathieu. Improvements in stereoscopes.
229. J. D. Tripe. Improvements in apparatus for securing window sashes or casements. Partly a communication.
232. E. Dench. An improved boiler for treating water for heating and warming.
246. E. Stevens. Improvements in machinery for preparing dough, paste, and like articles.
248. W. S. Clark. Improvements in copying presses. A communication.
268. J. Clifton. A new article of nursery furniture, or gymnastic exercising chair and support for children. A communication.
269. T. Neville and W. S. Dorsett. Improvements in steam boilers or steam generators, and in steam engines.
289. H. J. Sanders and S. Thacker. Improvements in machinery for the manufacture of textile and looped fabrics.
307. E. Cuvelier. Improvements in steam engines.
325. W. Clark. Improvements in filtering water, and in apparatus for the same. A communication.
341. G. Schaub. A new or improved manufacture of certain kinds of printing type and other printing surfaces.
378. S. Middleton. Improvements in the uniting or seaming articles of leather, and in the apparatus connected therewith.
383. J. Knott. An improved feeding bottle.
402. G. T. Bousfield. Improvements in knitting machines. A communication.
538. W. S. Clark. Improvements in machines for cutting and harvesting grain and grass crops. A communication.
567. W. H. Rhodes. Improvements in speed indicators and calculators.
725. O. Sarony. Improvements in producing photographic portraits.
809. C. Mather and H. Charlton. Improvements in apparatus for drying cotton, linen, wool, yarn, seed, and other articles.
894. T. Donkin. Improvements in apparatus employed in the manufacture of paper, applicable also to controlling the motion of travelling webs and fabrics. A communication.
902. J. O. York. Improvements in obtaining power when bi-sulphuret of carbon is used. A communication.
925. E. Hunt and H. D. Pochin. Improvements in the treatment and application of resins and resinous substances.
975. R. Wardell. Improvements in reaping machines.
990. W. H. Morrison. Improvements in means or apparatus employed in the manufacture of bonnet and cap fronts, rouches, and such like articles of millinery.
1030. T. and D. Brown. New or improved machinery for filing or smoothing the ends of fish plates, rails, wrought iron railway chairs, and other articles, made by sawing bars transversely.
1075. J. S. and W. H. Bailey. Improvements in machinery for preparing and combing wool, cotton, and other fibrous materials.
1099. C. W. Harrison. Improvements in obtaining light by electricity.
1107. A. A. Croll. Improvements in the treatment of sulphate of alumina, and in obtaining alum.
1110. G. M. Casentini. The manufacture of a solution for mixing with or gauging plaster of Paris (or any plaster having sulphate of lime or any similar substance for its base), so as to produce a hard and dense composition, the hardening or setting whereof may be retarded and regulated by the person using the same.
1148. A. P. Price. Improvements in the treatment and smelting of certain argentiferous or silver ores.
1219. J. Young and J. Strang. Improvements in the manufacture of starch, gum, or dextrine, and their compounds.
1243. J. E. F. Luedeke. Improvements in motive power engines.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

1306. Charles Constant Joseph Guffroy.
1312. Isaie Lippmann.
1313. George Frederick Chantrell.
1318. Cromwell Fleetwood Varley.
1321. Joseph Robinson.
1337. William Armitage.
1340. William Beckett Johnson.
1342. Charles Parker.
1350. William Moxon and John Clayton.
1353. Joseph Betteley.
1354. George Cottam.
1362. Samuel Cunliffe Lister.
1363. James Timmins Chance.
1365. William Clay.
1369. Hippolyte Mathis.
1425. Richard Keevil.
1442. Frederick William Mowbray.
1478. Robert Besley.

LIST OF SEALED PATENTS.

Sealed June 11th, 1858.

3057. John Stather.
3060. Julius Roberts and Miles Beale.
3068. Henry Duncan Preston Cunningham.
3070. Horatio Bunting.
3194. Carl Buhring.
204. Robert Harland.
616. Marc Antoine François Mennons.
644. Jean Jacques Theophile Schlœsing and Eugène Rolland.
842. Marc Antoine François Mennons.
886. George Gilmour.

Sealed June 15th, 1858.

3075. James Hogg, jun.
3076. William Smith.
3077. Edgar Breffit.
3078. John Bradley.
3079. James Chadwick.
3084. Thomas Howard.
3085. George Allen Everitt.
3087. James Green Gibson and Samuel Berrisford.
3091. Edwin Hills.
3092. Henry Gregory.

3095. Montague John Turner and Marcus William Turner.
3117. Thomas Hart, jun., and Abel Jones.
3121. Richard Archibald Brooman.
3134. James Tatlow and Henry Hodgkinson.
3136. William Basford.
3197. Augustin Julien Michel Ramar.
9. Archibald Slate.
21. Henry Constantine Jennings.
39. William Church.
212. William Rhodes and Henry Napier.
709. Cooper Tress.
819. William Spence.
875. William Henry Fox Talbot.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICES TO CORRESPONDENTS.

The letters of Captain Blakely and "A Mechanic" reached us too late for insertion in this Number. Other letters are in type and will shortly appear.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

NOTICE TO SUBSCRIBERS.

On Saturday, June 26th, a Double Number of the *Mechanics' Magazine* will be published, price 6*d*. The object of this arrangement is to assist in bringing up the arrears of the Abstracts of Specifications of Patents, to which the extra portion of the Double Number will be exclusively devoted. After the conclusion of the current volume, these Abstracts will be printed in a smaller type, in order to avoid the evil which has rendered this Double Number necessary.

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Mechanics' Magazine.

No. 1820.] SATURDAY, JUNE 26, 1858. [Price 6d.

Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London, E.C.

HARWOOD'S PATENT REAPING MACHINE.

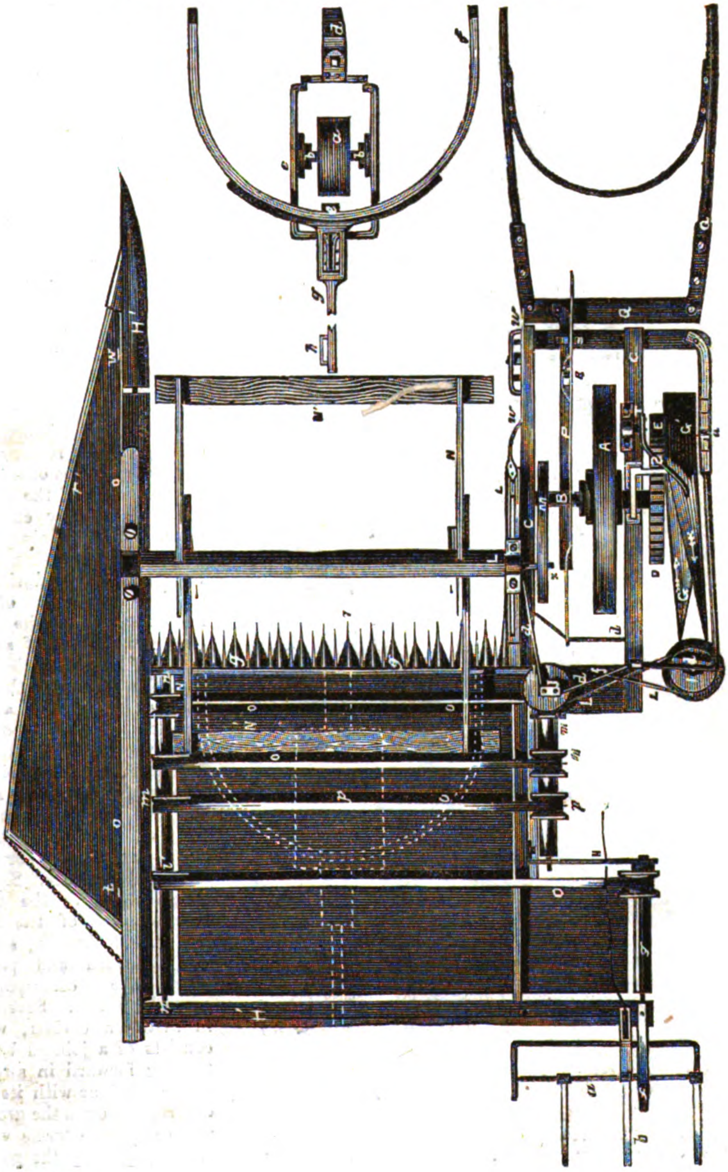
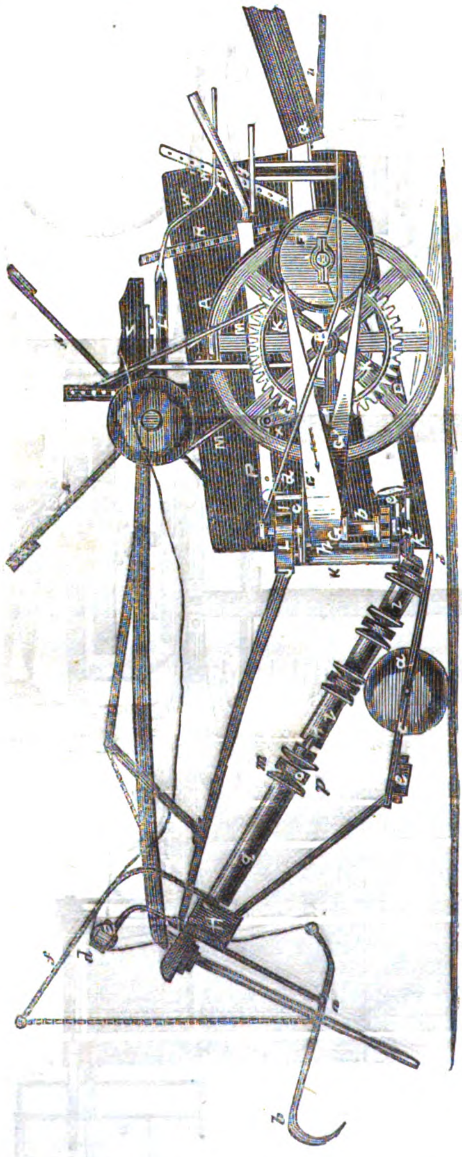


Fig. 1.

HARWOOD'S PATENT REAPING MACHINE.

Mr. W. Harwood, a practical agriculturist, of Mendlesham, Suffolk, has patented several improvements in reaping machines, which consist, first, in mounting the small or rear travelling wheel of reaping machines on an axle supported by a frame, which is centred or swivelled at one extremity, and carries at the other a roller which runs upon a curved bar or frame supporting it, the object being to prevent the said wheel from working or scraping into the soil when the reaping machine is turned in the field. Secondly, in providing for the instantaneous elevation or depression of the cutters by fitting a lever, from which depend lifting hooks or bars which catch under or are connected to the side frame, in such manner that the driver of the machine can instantaneously, by raising or depressing the said lever, lower or raise the cutters for any required purpose during the working of the machine in the field. Thirdly, in driving the reciprocating cutters by means of a belt or band in place of the gearing which is usually employed in order to avoid injury when obstacles are encountered. Fourthly, in producing the required pressure of the moveable upon the fixed cutters by means of springs carrying rollers at their extremities to reduce the friction, or by means of a lever or levers mounted upon the end or ends of the cutter bar, such lever or levers being at right angles (or nearly so) to the said bar, and provided with a screw or other adjusting contrivance for regulating the pressure. Sixthly, in attaching to the upper face of each of the lower cutters a forked lip, spreading backward and passing over the corresponding moveable cutter. Seventhly, in fitting a divider, which consists of a jointed bar extending forward in advance of the machine with its fore end resting upon the ground, and carrying a frame which divides (and raises if necessary) the corn or other material to be cut, guiding the portion

Fig. 2.



to be cut into the cutters. In some cases, where the corn is much laid or "lodged," the patentee employs a second such divider on the opposite side of the machine. Eighthly, in employing a rake with long teeth mounted in suitable bearings, and worked either manually or otherwise, for dividing the cut corn into sheaves, if required. Ninthly, in mounting the strap end of the gathering reel upon bearings in an adjustable lever. Tenthly, in fitting upon the shafts for the horses a curved backing bar or rod which rests upon springs in such manner that when the horses lower their haunches in backing, the said bar or rod against which their force is exerted may yield to them and become depressed. Lastly, in employing, between the whippletree and the point of the machine at which the traction of the horses is applied, a cranked lever or other suitable contrivance for balancing or counteracting, as far as may be, the side pressure exerted upon the horses.

In the accompanying engravings, Fig. 1 is a plan, and Fig. 2 a side elevation, of a reaping machine constructed according to Mr. Harwood's invention. A, is the travelling wheel on the shaft, B, which works in bearings in the framework, C. On one end of the shaft, B, the cogged wheel, D, is keyed; this wheel, D, gears into the pinion, E, on the shaft, *a*. To this shaft, *a*, the rigger or band wheel, F, is attached. G, is another rigger on the shaft, *b*, and round these riggers the strap or band, G, passes. *c*, is a flange to prevent the band from rising above the rigger. Over the flange, *c*, and on the same shaft, *b*, the rigger, I, is attached. J, is another rigger on a shaft, *h*, shown in dotted lines, Fig. 2; this shaft is surrounded by the roller, K, and this roller assists in throwing the cut crop off the machine, as will be hereafter described. Round the riggers, I and J, a band or strap, L, passes, as shown and arranged in the drawing. The riggers, I, J, and G, on their respective shafts are supported by the rods, *d*, *d*, screwed or bolted to the main framework, C. On the lower end of the shaft, *b*, the crank, *e*, is fixed; this crank, *e*, is joined to the connecting rod, *f*, which is jointed to and communicates motion to the knife, *g*. To the shaft, *h*, seen in dotted lines, Fig. 2, is attached a cogged wheel, *i*, which gears into a similar cogged wheel, *k*, on a shaft, which works in a bearing formed in the end of the roller, *l*. This roller, *l*, revolves in hollow bearings formed in the side framing of the platform; there is a smaller roller, *l′*, on the opposite side of the platform, which works in the frame, as shown at *n*, *n*. At suitable intervals on the rollers, *l*, *l*, are placed flanges, *m*, *m*, and between these flanges the endless straps or belts, *o*, *o*, pass; on these straps, at suitable distances apart, are placed spikes, *p*, *p*, which, revolving with the straps, push or assist in pushing the cut crop from the platform, whilst the flanges prevent the spikes from taking the crop round with them. In the outer end of the side frame, H, one end of a roller, *q*, works, supported at its opposite side in the back part, H′, of the frame of the platform. *r*, *r*, are guards through which the knife or cutter, *g*, works. The patentee sometimes uses two knives—one with a serrated edge, the other plain; the serrated edge runs free by releasing the rollers before-mentioned. On the shaft, B, the rigger, K, is keyed, and on a shaft, L, working in bearings at one end in the rod or regulating lever, L′, is keyed another rigger, L″, similar to the rigger, K, and round these the band or strap, M, passes. To the shaft, L, the arms or vanes, N, N, are connected, to the ends of which the cross pieces, N′, N′, are attached, and these as they revolve guide the corn to the cutters; the shaft, L, is supported at the opposite end in the beam, O; to this beam, O, one end of a frame or "divider," *r′*, is hinged, as seen at *t*, and the other end is attached in a similar manner to the frame, H′, as shown at *u*. He sometimes uses a second divider, extending forward before the machine, on the opposite side, as shown at *u′*, Fig. 2 (where it is broken short off), for preventing the horses from treading on the "lodged" corn. The end of the frame, H′, is jointed at *v*, to enable the point to rise or fall to every undulation in the soil when the machine is in motion. The height of the lever, L′, can be regulated by the rod *w* being lowered or raised, and kept in any required position by means of a pin entering holes formed in the upright *w′*, and this motion either tightens or slackens, as the case may be, the band, M, on the riggers, K and L″. There is a slot formed in the rod, L′, along which the shaft L, carrying the vanes can be pushed according to the distance it may be required to keep them from the corn and the knives. P is a lever having its fulcrum at *x*, supported by a strong piece of iron passing through the centre of the machine to the shafts, Q; the end of this lever is jointed to a rod which is connected to the after part of the machine in such manner that when the opposite end of the lever is lowered the hinder or back part of the machine will be raised, carrying with it the knife, and *vice versâ*, and so in this manner the height at which the corn or other crop may be cut is regulated to leave either a long or short stubble. This lever, P, is kept in any required position by entering grooves or notches formed in the side of the upright, R. S, is a lever connected to the locker, T, which enters the side of the pinion, E, for throwing the machine in and out of gear;

U, is a spring backing bar rivetted to the shafts, Q, in the manner seen in the side view, Fig. 2.

In the detached view, Fig. 3, and in dotted lines, Fig. 1, is shown in plan a view of the rear travelling wheel or "lock wheel," connected to the back part of the machine. *a*, is the wheel supported by a shaft, *b*, working in bearings formed in the frame, *c*; the end, *d*, of the frame is jointed to the machine, and to the other end a roller, *e*, revolving on a rod is attached. *f*, is a forked frame or bow iron, connected to the machine, and to the upper end of this frame a rod or lever, *g*, is connected, or made in a piece with it. This rod is supported at the rear of the machine by a looped part, K, passing through an iron piece depending from the frame work, H', and kept at any suitable height by a pin passing through holes formed in it. The advantage derived from this arrangement of travelling wheel is that the machine can be turned in any direction without damaging the soil or causing any pressure on the framework or other part of the machine.

In Figs. 1 and 2 is shown a rake fitted to the reaper for forming the cut corn into sheaves. *a*, is a rod, carrying the rakes *b*, *b*; this rod is attached to the frame H' by suitable connecting pieces. To the rod carrying the rakes is attached a cord, which passes over a pulley, *d*, working in a support, *e*, sufficiently long to reach the driver of the machine. *f*, is a bent spring, the outer end of which is connected, through the medium of a chain, to the rod, *a*. When the driver pulls the cord the rakes descend, and continue on the ground as long as the cord is kept tight, but as soon as it is released the spring, *f*, restores them to their original position. Or the cord may be dispensed with, and the rakes worked by a boy at the rear. Z, is a seat supported by the bracket, *z*, on which the driver sits; *y*, is a footboard.

The corn after being cut falls on the straps on the platform, and as the straps revolve they deliver the cut crop to the side of the machine, the roller, K, assisting the delivery thereof. The platform is formed of wood, but for the sake of lightness canvas or other suitable material may be used. The regulating apparatuses before described are all under the control of the person driving the machine. The machines are made of such a size that they will enter any ordinary gate, and are much lighter than those ordinarily constructed.

SOUTH KENSINGTON EXHIBITION OF WORKS OF ART-MANUFACTURE.

On Saturday last we were present at a private exhibition of works of art-manufacture designed or executed by students of the schools of art, in connection with the Science and Art Department, South Kensington, London. These works have since been submitted freely to public inspection, and may now be seen daily. This exhibition is the first attempt that has been made to illustrate publicly the action of the schools of art throughout the country in relation to manufacturing industry, and after every allowance has been made for the skill and taste brought into play by Mr. Wallis, the Special Superintendent of the Exhibition, in selecting the best of the works produced, it must be admitted that the display of genuine artistic feeling and manual dexterity evinced on the part of the students is highly creditable; and promises much for the success of the Government schools.

Schools of Design, as they were at first called, had their origin in a desire to bring artistic instruction to bear directly upon the industry of the country, by teaching the adult artizan in the evening. It was found, however, that the results were not satisfactory, and that it was desirable to commence the work of Art education before adolescence, and provide such elementary instruction as would tend to prepare children to become future students of the Arts of Design, as applied to manufacture. The basis was widened and made to include all classes; for it had become clear that the healthful supply of decorative manufactures of good taste must rest wholly upon the public appreciation and demand for them.

Soon after the establishment of the Practical Art Department in 1852 this elementary instruction became a primary object, and without in any way repudiating those departments of study which appeared calculated to educate the student practically for the intelligent application of his art knowledge in the manufactory, the neglected question of elementary instruction was placed upon such a footing as to give the future students in Schools of Art such advantages in rudimental training as should fit them with more certainty for undertaking the advanced studies essential to their education as designers and art-workmen. This has of necessity somewhat

arrested the earliest object of the schools, but will, it is expected, be made apparent in the results in future years.

The works comprising the present exhibition are mainly by students, past and present, of the former Schools of Design and the present Schools of Art; a few examples only being by masters engaged in the work of instruction, but nearly the whole of whom also owe the greater portion of their art education to these schools. Very few examples indeed have been specially prepared for this Exhibition, and therefore it represents, in the aggregate, the objects commonly in demand, in which the principles of decoration taught in the schools have been either fully or partially applied; but it is necessary in some degree, in justice to the designer, to take into consideration the exigencies of special manufacture, as also certain commercial requirements.

The articles exhibited, were they ten times as numerous, would only illustrate the *direct* action of the schools in that form alone in which it is practicable to show it. There has been, however, an *indirect* action perhaps even more valuable, and of such a character as to encourage further efforts in bringing art instruction to bear upon national industry, and especially in seeking to maintain an ornamental bias in the course of studies pursued in the Schools of Art. The lace trade of Nottingham is an example in point. Manufacturers who have not actually employed students of the school as designers acknowledge that the character of the designs produced within the last five years has been altogether changed through the influence of the designs manufactured by those who have employed the talent developed in the School of Art.

The action of the schools at Sheffield, the Staffordshire Potteries, and Worcester, have been of a very direct character.

That those who have passed through the Schools of Art are more intelligent workmen than those of similar age and standing who have not attended the classes, is acknowledged on all hands. At present, however, very much which they do is buried, so to speak, under the work of others more advanced in technical power, or, as in the decoration of papier mâché, they execute the trade designs produced by able and experienced workmen, thoroughly acquainted with modes of production and the commercial notions of their employer or his customers. Art stands little chance in the market under such circumstances, because the buyer seeks rather for *novelty* than *truth*.

In the last Report of the Local Committee of the Birmingham School of Art, a statement is inserted which shows in a very plain manner the action of the school in that town in relation to local industries. This is as follows:—

"On analysing the occupations of 4,938 students who passed through the classes of the school during the fourteen years since its establishment in 1843, there are found 81 modellers for manufactures, 100 brassfounders, 268 japanners, 249 engravers, 158 jewellers or silversmiths, 200 die sinkers, 50 glass painters, 113 chasers, and 106 engineers, machinists, or engine-fitters. It must be quite clear, therefore, that, with such an attendance on the part of those to whom a knowledge of drawing is valuable, the results must have been very beneficial to the manufacturing industry of the town, and therefore of great practical value to the manufacturers themselves."

The general influence exercised throughout the country may be illustrated by an analysis of the results given in a table of the occupations of 8,516 students attending in 39 provincial Schools of Art during the year 1856-7, inserted in Fifth Report of the Science and Art Department. In this number are included 104 architects, 45 builders, 257 carpenters, 73 carvers, 82 cabinetmakers, 88 draughtsmen, 120 designers, 54 die sinkers, 180 engravers, 213 engineers, 68 jewellers, 541 mechanics, 163 metal workers, and 44 modellers.

The bearing of Schools of Art on design, as applied to textile fabrics, has been most difficult to illustrate in a satisfactory manner.

Nothing except the creation of a demand for a better character of design by the public is ever likely materially to improve calico prints, in any permanent degree at least. Printers of any eminence, especially at Manchester, complain universally, and very justly, of the extent to which they are plundered with impunity of their patterns by an organized system of piracy. Producers grow careless under such circumstances, when they know that unscrupulous rivals wait periodically to enter into the results of their enterprise and skill.

Glasgow suffers from much the same cause as Manchester, although, from the greater variety of fabrics produced, the school in this city, as also that at Paisley, is comparatively well represented. In each place, however, certain trade peculiarities and the feelings of manufacturers on the question of publicity have influenced not only the number but the character of the contributions.

In Macclesfield efforts have certainly been made to render the School of Art useful to the silk trade of the district. Designs for garment silks, handkerchiefs, scarfs, &c., have been produced, which it is

not too much to say promise well for the future.

It is highly satisfactory to know that the greater part of those former students of the schools at Somerset House and Marlborough House, whose works are exhibited on this occasion, attribute much of their success to the facilities for study, in their own way and at their own leisure, afforded them by the library and museum.

As may be supposed, some manufacturers have declined to show publicly the source whence they have derived many of their best designs, although acknowledging that one source, at least, was the schools, where those employed by them obtained their early instruction in Art. This could not be denied, since the works they produce bear unmistakeable evidence that that instruction has not been thrown away.

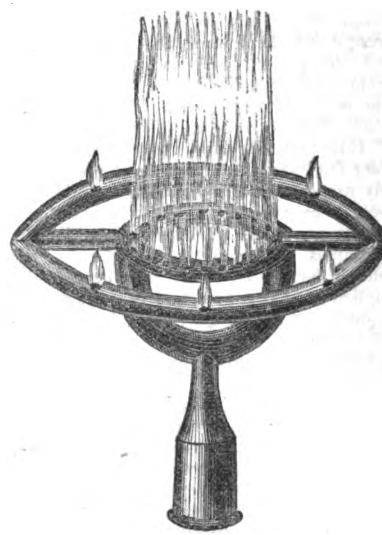
In many instances where it was impossible to fairly show their works, former students of the schools have honourably and unhesitatingly acknowledged their obligations, and expressed regret that want of time, commercial exigencies necessitating the concealment of the origin of manufactured goods, or the fear of piracy of new patterns, prevented them contributing to this exhibition in a manner which would be satisfactory to themselves and creditable to the manufacturers by whom they are employed.

We are indebted for most of the foregoing facts to Mr. Wallis's interesting introduction to the catalogue.

We cannot conclude this article without calling attention to the admirable specimens of the combined metallic and marble works of art, made under the patent of Mr. Potts, of Handsworth, Birmingham, of which we took notice a year or two since. Nothing could be more elegant and effective than these works of what may be called a new art.

IMPROVED ARGAND GAS-BURNERS.

An American inventor has lately patented in this country the improved argand gas-burner represented in the annexed engraving. The object of the invention is to produce a steady flame and a more complete combustion of the carbon held in suspension in the gas in such manner as to dispense, if desired, with the necessity of employing a shade or a chimney, without which that form of burner has heretofore been useless. The invention consists in surrounding the central ring of orifices for the escape of gas by an additional ring of lesser orifices, which are placed equidistant from the central ones, as well as from each other; about six of these will be found to



answer a good purpose. The inventor has discovered that by this arrangement the smaller flames obtained in burning the gas produce upon the central and greater ones the effect of obviating all flickering and smoking, so that the argand may be burned at its maximum height without the use of a chimney.

THE ATLANTIC CABLE.

To the Editors of the Mechanics' Magazine.

Gentlemen,—I cannot think how I can have given Mr. Longridge the idea that I attributed his letter, remarking on the Astronomer Royal's paper, to a mere love of controversy. I can only express my deep regret at having chosen words so ill expressing my meaning, which was simply that I thought he misconstrued the paper; and that it was a pity he had done so, and dwelt on those points on which there is an apparent difference of opinion between the learned Professor and himself, when in reality (especially since the discussion on the paper of himself and Mr. Brooks) nearly all agree on the important points, viz.:—

1. That a cable of a lighter specific gravity than the present Atlantic cable could be more easily and safely laid.

2. That, whatever the specific gravity a constant uniform tension on the cable clearing the ship equal to the weight of a piece in

water long enough to reach from the surface of the sea to the bottom (minus a certain allowance for longitudinal friction) will enable the cable to be laid without waste.

The points on which difference of opinion exists are comparatively unimportant. The engineers of the Atlantic telegraph and myself think that the tension cannot be given in a heavy sea with the necessary uniformity, and consider a certain waste unavoidable. Mr. Longridge, on the contrary, thinks that a sufficiently uniform tension can be given. His words, "No cable should be laid with much slack" (in reply to my remark that, in very deep water, no other method of laying a cable is practicable) cannot surely apply to the case where the depth is so great that the cable could not support its own weight where there are currents and stormy weather. Mr. Longridge calls on me to explain how the specific gravity can affect the tension caused by friction. It would do so, I think, in several ways:—1. The less the specific gravity the less will be the velocity of the sinking; and the friction varies inversely nearly as the square of the velocity. 2. The speed of the vessel being the same, more of a light cable will always be in motion between the ship and the bottom than if the cable be heavy; surely the friction varies directly as the length of cable moving.

What Mr. Longridge means is evidently that the mathematical expression is not altered, the friction being always the same function of the velocity and of the length. In this he is of course right. With respect to the Astronomer-Royal, I cannot presume to discuss his opinions; but I may venture to repeat my remark that, as they are expressed in his paper, they in no manner clash with those of Messrs. Longridge and Brooks, except as to the amount of friction, on which point the learned Professor most frankly stated that he felt uncertain.

His words, "If by inattention to the mechanism, the delivery is impeded for a time," and (although in another paragraph), "The preparation of such a table necessarily implies that the cable is delivered with the same speed with which the ship passes through the water," protect his table, I think, from being legitimately construed as meaning that, *all going smoothly and the cable not being checked*, its angle may (without any increase of the ship's speed) be altered from 26° to 2°. Really, Mr. Longridge's caution against such a misconception seems unnecessary.

As to my "free translation," I do not know, Gentlemen, whom to blame,—your printer, or myself for using a bad pen; but I certainly never meant to put the inverted commas which Mr. Longridge so justly condemns, although the words between them express the evident meaning of the Astronomer-Royal.

I am, Gentlemen,
Your obedient servant,
T. A. Blakely.

P.S. The late trial trip has proved how correct were Mr. Longridge's views. He had distinctly pointed out the danger of passing the cable over pulleys or rollers made to revolve in equal times, as their circumferences might be originally unequal, or might become so from an accumulation of tar, thus causing a local strain. On board both the *Niagara* and *Agamemnon* the cable was broken from a neglect of this warning, the point of rupture—between the pulleys—leaving no doubt as to the cause.

HUGHES' PRINTING TELEGRAPH.

[We have received the following letter from Mr. Hyde, the agent of Professor Hughes, in reference to a paragraph which appeared in a recent article on the Atlantic Cable. As we have no desire whatever to do injustice to the American instrument, but, on the contrary, are anxious that its merits should be impartially estimated, we have much pleasure in giving insertion to Mr. Hyde's communication.]

Gentlemen,—In your Number of the 12th June, "your own correspondent" says, "The Hughes' printing instrument, which, in short circuits prints in the Roman characters with the greatest facility, almost totally fails with the Atlantic Cable. His different relays depend for their isochronism upon the uniform movements of clockwork, but, as the currents through the cable are extremely sluggish in their course, the relays in different parts of the circuit are sometimes in advance of each other when the current arrives; and if, for instance, the word STAR were printed upon one, it might come out TUBS in the other."

I am persuaded that both you and your correspondent wish to publish the truth; if so, allow me to correct the errors in the above quotation, which, it is to be feared, have been written upon information furnished by prejudiced, and, perhaps, jealous parties, who may be interested in some other instrument.

If the Hughes' instrument "almost totally fails on the Atlantic Cable," what may be said of the Whitehouse instrument, which can only transmit *one* word a

minute, while the Hughes' instrument sends two and a-half?

It is true that the Hughes' instruments depend upon "uniform movements," which uniformity there is no difficulty in sustaining. This fact is demonstrated by the actual working of the instruments over several hundreds of miles of wire in America, on which they have superseded both the Morse and the House instruments, simply because they print the Roman character, work reliably, and faster than any other system. If, then, the Hughes' system works well, with a currrent passed through a wire in the air, what is to prevent its working well with a current through the cable? Certainly, it will not be seriously argued, that the "current being extremely sluggish," a timing instrument cannot be adapted to its slow rate of speed!

Doctor Whitehouse, the electrician of the Company, stated in his Report, dated 4th January, 1858, that "by the adoption of such an amount of abbrevation or code signals as we find it safe to use, we are now transmitting, through the entire length of our cable, despatches at the rate of four words a-minute." With Dr. Whitehouse's instrument an average of five waves are necessary for each letter. Assuming there are five letters in each word, he would require one hundred waves a-minute to transmit four full words. The instruments we brought with us, and first tried on the cable some weeks ago, were based upon this rate of speed, but we found that instead of Dr. Whitehouse being able to get *one hundred* waves a-minute, he could not get an average of over *twenty*, and, consequently, he could only transmit *one* word, or a little less, a-minute, while the other *three* words were to be found only in "abbreviation or code," or perhaps, more properly speaking, in the imagination. Consequently our timing instruments, intended for a speed of at least SIXTY waves a-minute, could not work with accuracy with TWENTY waves a-minute; but on making a little mechanical alteration of the "clockwork," reducing the rate of speed to the "extremely sluggish current," we found no difficulty in transmitting messages reliably and correctly at the rate of two and a-half to three full words a-minute, and this, too, when the number of waves were considerably less than *twenty* a minute. As previously stated, the Whitehouse or Morse system of characters requires *five* waves for each letter, while the Hughes' system transmits a letter *every wave*, and will do it correctly; and, therefore, the owners of the patent are content to wait patiently until the shareholders get tired of paying enormous bills for experiments which are apparently intended to amuse or instruct the Company's electrician.

I am, Gentlemen,
Your obliged and humble servant,
H. HYDE.

INSTANTANEOUS PHOTOGRAPHY.

[We are unable to add illustrative engravings to the following letter; but our mathematical readers will, we doubt not, be able to grasp the problem of which Mr. Skaife desires to obtain a solution, as the principles involved are applicable, whatever may be the assumed dimensions and distances involved.]

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Perhaps some of your numerous scientific correspondents will have the goodness to assist me over the following "*Pont d'asine.*"

On the 1st of this month, during the artillery practice of the Royal Cadets on Plumstead marshes, an 8-inch shot was fired from a howitzer at a butt target, distant 800 or 1000 yards; but, not having actually measured the distance, and my memory misgiving me as to the exact figure named by the authorities, I am endeavouring to spell it from a hasty memorandum I took at the time in the shape of a photo-stereo of the shot as it was passing through the air, about two seconds after it had left the muzzle of the howitzer. I enclose a proof print from this photo-stereo; but, as trace of the shot is very faint, especially in the right eye view, a horizontal line from the left of each view will be found drawn in the direction of the shot, the exact locale of which is found to be in the angular point of intersection by another line drawn perpendicular to the first, which perpendicular drawn through centre of shot, and continued till on a line with a powder canister seen to the right on the corner of the platform whence the recently-fired howitzer stands, and the distance measured between each perpendicular and its neighbouring canister, it will be found that the distance between the perpendicular and canister in the left eye view exceeds that in the right by nearly half the diameter of the canister; but, as I do not know the diameter of the canister, nor its exact distance from the two parallel lenses (three inches apart from centre to centre), I suspect this is too imperfect data to enable a mathematician to calculate the distance of the ball in the air from the powder canister in question.

But, on referring to another stereo

(No. 2), photographed from the stern of the *Plover* steamer, during her passage from Blackwall to Woolwich, I perceive the nearest object in the two halves of this view to be a handle spoke, on the outside of the steering wheel. This spoke, when the stereo was taken, was distant about five feet from the camera's two lenses. Now, on drawing a perpendicular line through each half view where the line would touch the outer extremity of the spoke, it will be seen that the line in the left eye view has intersected a building on the Blackwall pier, distant 1,000 yards to the right, whilst the other perpendicular has intersected it to the left, giving a difference between the two of a quarter of an inch. Therefore I think it will be obvious, were we to fix upon one of the sharp waves just under the stern of the steamer, as being equal in distance from the camera to that of the powder canister from the camera, and there commence a perpendicular line in each half view, beginning with a difference of nearly half the diameter of the canister, and continuing the lines upwards until they shall each cut a corresponding break in the water at the same point in each; then measure the distance on the water which the perpendiculars have covered, the resulting figure will be that of the shot in the air from the canister in stereo No. 1. This position granted, I wish to be informed whether there be not some known scale or instrument practically available to finding the longitude of a required object seen in the two dissimilar halves of a stereoscopic picture, as is a sextant by mariners in finding their longitude at sea. Being really at sea in this matter, perhaps some kindly star will point my course.

In conclusion, permit me to state that, if any military or naval gentleman would like to personally inspect the negative from which the enclosed photographed flying shot was printed, I should be happy to show it whenever at home, which I usually am at this season between six p.m. and sunset.

I am, Gentlemen,

Yours obediently,

THOS. SKAIFE.

Vanburgh House, Blackheath,
June 17, 1858.

OUR COAST DEFENCES.

GENTLEMEN,—That we have neglected to avail ourselves rightly of the best means by which our national security can be effected, is patent to the world at large. Let us hope that the time has arrived when Her Majesty's advisers feel called upon to retrieve that neglect by appropriate and effectual preparation.

When a Government can keep out of use that which it is the interest of the State to adopt, it is very evident something radically wrong must be the cause, and the sooner that wrong is traced to its source and corrected, the sooner will the State derive the advantages of that of which it has been deprived. The same causes bear also on the adoption of inappropriate and expensive plans which have unjustifiably found their way into the public services of the country at the cost of millions.

But without entering into a lengthy detail of such improvements as have been kept out of public use, or those abortive plans introduced by impolitic party Administrations within the last fifty years, I shall come at once to the fact of our neglected coast defences, now commanding so much attention, and absolutely demanded for our future security to be placed on a basis such as shall remove all grounds for that uneasiness which neglect is daily increasing.

In my last communication, which appeared in No. 1817, and others which have appeared in the *Mechanics' Magazine* since July 1857, I have felt it my duty to notice this important subject in a way which I hope will be productive of some good; and, although I have not had influence of the *right sort* to induce the Government to make experiments at my suggestion with iron plates to destroy the effect of shot, others have; and, so far as those experiments have gone, they have produced results corroborative of the correctness of my conclusions as to which way iron defences can be most effectually constructed.

For coast purposes our defences must be so constructed as to defy successful attack by sea, but they must not be placed at elevations out of the reach of ship shot, under the mistaken notions of security, and be thus rendered comparatively useless by want of precision. They should be placed in positions to defy the approach or passage of the assailant by the most destructive fire, and with the *certainty* of striking the object fired at within range, and without bounding over should the shot ricochet; and they should also be constructed invulnerable, that the men may stand to their guns and work them effectually at close quarters; and this, I will repeat, can be accomplished with iron defences, such as I have numerous examples to select from.

Earthwork will not do for such batteries so near the sea; neither will stone, as it will not stand the effect of iron shot. Iron is the most appropriate material, and may be so employed as not to be more expensive than stone: and here I will take the liberty of again calling attention to Dr. H. Drake's

caisson impregnable batteries constructed for coast defence, which commanded the attention of the Select Committee in 1854, as batteries productive of the most deadly results by horizontal firing; and to my impregnable revolving redoubts which Viscount Palmerston authorised me to place at his command just previous to his Lordship's resignation.

For naval attacking purposes, experiments are now making at Portsmouth with wrought-iron plates; but why such secrecy should be observed no reasonable man can comprehend, knowing, as we all do, whatever may be the results of those experiments, they will be soon known to France, Russia, and America, and every other Power interested. If France could see the necessity of setting the example of employing iron plates, which our Admiralty might have done without extraneous influence of any kind, long since, surely she can see the necessity of following an example if productive of better results; and the late debates on the navy pointed out the absurdity of attempting covertly to keep the world in ignorance of our real strength and resources as a maritime country.

Let us have no more of the nonsense of attempting to conceal or deceive, by garbled statements, *those who will not be deceived*, for we have nothing to fear if we are faithful to ourselves; and let us not trouble ourselves why other countries think proper to increase their navies, as, we may rest assured, such explanations as *we desire* will not be granted; but, in the name of common sense, and for the security of our own country on honourable grounds, let us be efficiently prepared to defend ourselves, without willingly offending any one; and we know that England has within herself inexhaustible resources, without being dependant for one single thing in connexion with our land defences.

England can no longer afford to sacrifice her security in the shape of patronage and private interests as she once could; and it is to be hoped the Government will not directly or indirectly give encouragement to undue influence in any quarter calculated to keep back those improvements which the future protection of the United Kingdom so imperatively demands.

I remain, Gentlemen,

Yours, &c.,

JOHN POAD DRAKE.

London, June 12, 1858.

THE STABILITY OF FLOATING BODIES.

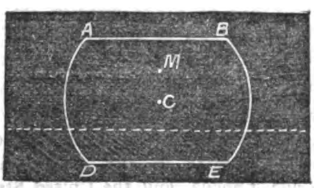
To the Editors of the Mechanics' Magazine.

GENTLEMEN, — "Nauticus" seems to have formed his opinion respecting the rolling motion of a floating body from some supposed analogy to a pendulum, the metacentre for each position corresponding instantaneously to the point of suspension. In a former letter I described this supposed motion as taking place about the metacentre *as a fixed point.* "Nauticus" regards this as a misrepresentation of his hypothesis. This application of the phrase may, perhaps, be open to some objection, as it is liable to be misunderstood; but I intended it merely as a forcible way of stating the proposition which your correspondent puts in the following terms:—"At every instant," he says, "the metacentre of that instant is the point round which the centre of gravity revolves." This seems to me the same thing as saying that, "At every instant the metacentre of that instant *is the fixed point* about which the body revolves." I did not, however, state the case exactly thus; as, when I made my hurried allusion to the question, I was thinking merely of the initial motion, and meant to say, that when the deflection of the body from the upright begins, there are many cases in which the motion of the centre of gravity has a vertical component, and does not commence wholly in the horizontal direction, as the supposition of your correspondent requires.

There is a very short way of upsetting the theorem which your correspondent asserts, but does not attempt to prove. The little word "Why?" has overthrown many a fine theory in natural science, metaphysics, theology, &c. It is a simple method of combating most persons who deal in strong assertion, — ask them, "Why?" This simple method may be used in the present case. I am told that in the rolling motion of a floating body the instantaneous axis of rotation passes through the metacentre. But why? As in many such cases, I know that if your correspondent attempts to answer this little question he will be driven to confute himself. To go a little into particulars: take his cylinder, Fig. 2, of his last letter. He tells us that the centre of gravity, G, will describe a semicircle about the metacentre, M. Now, such a motion would develop no horizontal force to act upon the body, for there would be no fluid put in motion at all. Why, then, should the centre of gravity of the cylinder *volunteer* a motion which no known law of nature requires it to adopt?

I have one argument against the hypothesis of your correspondent, which will, perhaps, cause him a little surprise. I dare say he will see readily enough that if his supposition at present under discussion corresponds with fact, then for a position of stable equilibrium the centre of gravity of the body will be at a minimum height, and for unstable equilibrium at a maximum height. This very proposition your correspondent wrote to disprove in his first letter on this subject—or, at least, the triangular prisms which he then adduced, disprove his present theory. For, in the case, say, of the cork prism, whose section is an equilateral triangle, the centre of gravity *descends* from the position of *stable* equilibrium, and *ascends* from the position of *unstable* equilibrium. Whereas, if the centre of gravity began to move about the metacentre, it would ascend from the position of stable equilibrium, and descend from that of unstable equilibrium.

The following is a case of a different kind, though equally unfavourable to your correspondent's idea. Take a homogeneous cylinder of cork, and plane off two equal and opposite segments, so that its section may be represented by the figure annexed.



The water line, for a position of stable equilibrium, will be parallel to D E or A B. Now, during any amount of deflection which does not bring an angle D or E above the surface of the fluid, the centre of gravity, C, remains at precisely the same height above the centre of flotation; so that, if it moves at all, the motion takes place in a straight line parallel to the surface of the water, and not about any point at a finite distance.

As to the general solution of the question, "How does the body move?" I shall not attempt to give any, for I see so many difficulties in it, that I almost regret having alluded to it at all.

Yours, &c.,

A MECHANIC.

MISMANAGEMENT OF THE GOVERNMENT WORKS AT WOOLWICH.

GENTLEMEN,—In your Number 1819, page 586, you have judiciously published a paragraph from the *Times* of June 14 which, as you very justly observe, "*speaks for itself.*" The Royal Commissioner appointed to investigate the mismanagement of public affairs at Woolwich will do well to institute inquiry into other matters besides the Royal Gun Factory, the Laboratory, and Hyde-park firework expenditure. Let him investigate the whole management of the establishment in connection with the Russian war, and since, and he will find ample grounds for recommending sweeping changes for the benefit of the service. Let him, among other things, see on what grounds the 6,000 inventions were rejected in 1855 without investigation, and let him see on what sort of patronage those approved of from the commencement of the war up to 1857 were brought into notice, particularly the six American breech-loading guns (now admitted not to be worth more than their weight in old iron), and he will render the country and practical science a lasting and incalculable benefit.

England requires such duties to be faithfully and honourably discharged, and the time has arrived when they must be discharged, without the shadow of reserve or loss of time, if this country is to regain that proud position which has been so sadly shaken since her public establishments fell into the hands of that class of statesmen whose object was *to make the most out of them* instead of improving them, as they *professed*.

There are those at Woolwich anxious for the change, and will be happy to be relieved from duties with which they are not only not acquainted, but have not time to attend to, and who wish to see "*the right man in the right place;*" and the Royal Commissioner will soon discover this fact if he proceeds in unison with the importance of the trust with which the Government have so wisely invested him.

OBSERVER.

June 19.

LORD CARLINGFORD'S FLYING MACHINE.

VISCOUNT CARLINGFORD writes:—"Although I have not yet taken flight in the Arendon, which name I have given to my aerial chariot, I may with confidence and truth announce to you and the world the success of its principles from the results I

obtained by an experiment three days ago. I would have informed you of this circumstance sooner, but I was anxious to make another experiment, which I fully expect will prove still more satisfactory to the general public. However, as there will be some delay, in consequence of two of the principal laths being broken,—the wood of which was very imperfect,—and as you may desire to receive this information before it becomes generally known, I shall not wait any longer for that event, which to the scientific may not be deemed requisite. When I have made a few more experiments, and found out the weight the present extent of wing will be able to bear, and if found sufficient to carry a person without being put to any great speed, which I consider most likely to be the case, it shall be taken to Dublin without delay, and there be exhibited for charitable purposes and to the criticism of all."

THE IRON TRADE.

FROM OUR OWN CORRESPONDENT AT WOLVERHAMPTON.

Condition in the past month in South and North Wales and South Staffordshire—Scarcity of Orders—Effects of the Hot Weather—Orders offered at low prices—Quality should be kept up—Board of Trade Returns—Preliminary Meeting.

The past month has been a period of languidness in regard to the iron trade, almost without parallel in its history at any previous corresponding month. As compared with last month, the trade is upon the whole in a less prosperous condition.

South Wales presents a slight exception to this state of things, some tolerably good orders for rails having been given out there; and North Wales is slightly sympathetic with the South.

In South Staffordshire no works are scarcely more than half employed. The only orders of importance that have been delivered there in the past month have been some for the military and civil engineering purposes of the East India Company.

The absence of orders has not produced the inconvenience in the past fortnight that would have done if the temperature of the atmosphere had not been so high as to almost entirely incapacitate the puddlers from working.

More orders might be obtained in South Staffordshire if makers of best iron would concede the demands of buyers in regard to prices. These demands are, however, so very low that if makers submitted to them the iron could not be made at a profit. At the same time, the prices fixed upon at Quarter-day have not been adhered to in all the transactions of even first-class houses. In fact, the question of prices is becoming more and more an open one.

With respect to inferior descriptions, a movement of any kind is scarcely perceptible. South Staffordshire cannot compete, on the question of prices, in such descriptions, with other and newer districts. If that part of the kingdom, which has been so long celebrated for the excellency of its iron, is to maintain its position, that must be done by keeping up the standard of quality.

The Board of Trade Returns for last month show that, as compared with the previous month, the decline of pig iron was general, with the exception that there was an increased exportation to Holland; but cast iron improved in consequence of a considerable increase in the shipments to Australia, Canada, and the United States. In wrought iron the only increase was to India.

The preliminary Meeting for this quarter was held on the 24th inst., as is customary at this season, at that cosey way-side hostelry (with its attractive bowling-green), called the "Stewpony," on the borders of Staffordshire and Shropshire.

Attempted Infringement of Macfarlane's Patent for Moulding Pipes.—We have received further communications respecting the paragraphs which have appeared under this heading. We cannot afford space for these; but we must say that Mr. Macfarlane evidently acted with precipitancy in sending the first article to the press; and that the applicants for the new patent, Messrs. Stevens, Reid, and Frew, are perfectly free from blame in the matter. We cannot give place to any further remarks on this subject.

POPULAR FALLACIES.

Gentlemen,—There are few books on science which do not, to some extent, contain errors of both a graphical and descriptive nature; and this more particularly applies to those of a strictly popular kind. I will adduce a few examples in confirmation of this.

There is often a great want of proportion, so much that, if we had no previous knowledge of the thing represented, we could not fail to imbibe an erroneous notion respecting it, supposing that it was not verbally described; and even if this were the case a faulty diagram does much to confuse. If certain portions of a drawing require to be represented on a larger scale than the rest this should be always stated, instead of, as is sometimes the case, allowing the fact to go unnoticed.

The abuse of terms is a very serious and oft met with fallacy. Nothing is more common than to find the indiscriminate use of the words "hypothesis" and "theory." Every crude guess is now graced by the appellation of a "theory," although there may not be the shadow of a proof to substantiate its veracity. Again, the issue of any expected circumstance is said to be "problematical," which is understood to mean admits of doubt; but the term is incorrectly applied, as its literal meaning altogether fails to explain what is meant.

I think that the term "concentrate" is sometimes misapplied. As an instance, it is incorrect to say that the rays which penetrate a dark room through an aperture or crack are "concentrated"; they are no more so than those which fall upon any portion of surface of the same size without, and their intensity which appears heightened by contrast in no way proves that any concentration takes place. Such an idea is, in fact, quite unwarrantable, and opposed to the nature of the phenomenon.

The meaning of "reflection" is, I think, sometimes unwarrantably extended. Certainly it means to "bend again," but as philosophers generally have used it in the sense of "bending back" we have hardly a right to use it as expressing a mere change of direction. A rather celebrated writer* makes use of it in the sense of simple refraction. He says that the atmosphere is the cause of reflection, evidently meaning what the former term sufficiently signifies. It should be borne in mind that although reflection must always be refraction the converse of this need not be true; it may or it may not. Most, if not all, mechanical treatises speak of the lever, screw, wedge, &c., as mechanical "powers;" but a little consideration will satisfy anyone that the term "power" has no business here, and is apt to mislead. Power is an active agent, whereas the instruments by which it is conveyed are perfectly passive, and should therefore be styled "appliances."

* Paley—*Natural Theology.*

The terms "rotation" and "revolution" are sometimes wrongly applied. A cart wheel, unless caused to move round some point without, cannot be said to "revolve," any more than a cup of water swung round by a string can be said to "rotate." The same may be said of "philosophy" and "science." These words are not capable of free interchange, inasmuch as the former need not include the latter, although the converse of this must be true. I adhere to this notwithstanding the affirmation of a writer* of authority that "the universality of law and order" elevates science into philosophy.

A great want of proportion may often be seen in diagrams illustrative of hydraulic machinery; the size of pipes is far too large in comparison with that of the cylinders, both with regard to length and thickness. Another graphical fallacy which is almost universal in astronomical illustrations is that of representing objects as they appear, and not as they really are. Thus, the sun is made much smaller than the earth. I can see no reason for this, except it is erroneously thought that this aids to show why the equator is warmer than places to the north or south of it by exaggerating the spreading of the sun's rays, which is, of course, the necessary consequence of making them appear to come from a smaller upon a larger body.

J. A. Davies.

May 18, 1858.

ALTITUDE OF THE SUN.

Gentlemen,—The angle of the sun can be easily found by placing a stick in the ground at any angle, and causing another to meet its top and the end of its shadow. It can then be measured: or the moveable stick may have a hinge, which should be placed at the extremity of the shadow. There should also be a graduated arc fixed upon that part of the stick which is placed upon the ground. I need hardly say that the greater the distance between the end of the shadow and the extremity of the stick the greater the correctness of observation that may be expected.

J. A. Davies.

May 18, 1858.

* Powell—*Unity of Worlds.*

REGULARITY OF NATURAL FORMS.

Gentlemen,—I have always thought that this department of the theory of growth is of a more astonishing character than any other phenomena with which we are acquainted, not even excepting the theory of gravitation. I have never yet seen an attempt to explain it, and should be glad to offer a few remarks upon the subject. With regard to the nature and development of the vital principle affecting and regulating the vegetable world I have nothing at present to say, and would merely endeavour to point out the only two distinct ways by which the form of plants, &c., can be determined. In conjectures of this sort some have fallen into the error of endowing mere matter with the properties of mind; an obvious fallacy, and one which it behoves all rational inquirers to guard against.

It is probable that gravity affects to some extent the form, and electricity the nature, of plants; but it is impossible that either or both of these can alone regulate the various forms to be found in the simplest weed. We obviously want something more, and what that must be, and how it acts, I will now endeavour to show.

1. Different kinds of vegetable matter have various properties, so that the vital force acting upon them brings them into the forms we see; or (2.) the atmosphere, or some more attenuated medium, acts as a mould in which the various parts of plants are formed, different vegetable substances penetrating this universal mould according to their various qualities, and thus assuming various forms, being expanded and propelled by the vital and solar forces respectively.

These appear to me to be the only two simple ways by which the forms of the different parts of plants can be determined. It is quite possible that something of this sort takes place; but, as it seems that the state of science is scarcely far enough advanced to determine either for or against such hypotheses, we must, perhaps, content ourselves for the present with weighing the probability of their truth, and endeavouring to cite analogous points of science bearing either for or against them.

Yours, &c., J. A. Davies.

June 15, 1858.

Mr. J. A. Longridge, C.E.—It appears that Mr. J. A. Longridge, C.E., has been sent out with two assistants to make surveys in the Mauritius, and to report upon the capabilities of the colony for the introduction of Railways.—*Times.*

CAPTAIN NORTON'S CONCUSSION FUZE.

Captain Norton has recently received the following letter:—

"War-office, 15th June, 1858.

"Sir,—In reply to your communication of the 20th April last, submitting for consideration an improved concussion fuze of your invention, I am directed by Secretary Major-General Peel to inform you that the Ordnance Select Committee have reported that they do not consider it superior to the concussion fuze of the service, invented by Sergeant-Major (now Captain) Freeborn, against which it had been already tried, although before the recent improvements which you have introduced into it, in 1845.

"Under these circumstances Major-General Peel regrets that he cannot authorize any experiments in connection with it.

"I am, Sir, your obedient servant,

"Hardinge.

"Captain Norton, Rosherville, Gravesend."

It is much to be regretted that our highest military authority can find no better reason for slighting an invention than that it was tried unsuccessfully in an imperfect form thirteen years ago. If General Peel authorizes the writing of many letters like the above he will speedily damage the Government in public estimation, and bring himself into merited contempt.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Winder, J. H. *Improvements in rotary steam engines and pumps.* Dated Sept. 16, 1857. (No. 2402.)

Two oval pistons revolve in a double case, and are so placed that one of the surfaces in the largest diameter of each piston constantly forms a packing with the case, whilst the larger radii of each piston alternately make contact with the smaller radii of the other.

Middleton, W., jun., and T. T. Chellingworth. *Certain improvements in adjusting the sliding parts of chandeliers and gas pendants.* Dated Sept. 16, 1857. (No. 2403.)

This invention supersedes balance weights for chandeliers and pendants by the use of springs coiled up in boxes, that as the chandelier slide or pendant is pulled down the springs are wound up. Or the patentees effect the same object by making the tubes that pass down one in the other of such chandelier or pendants of what is called twisted tube; the inner one being fixed to

the ceiling, leaves the outer or lower one free to be raised or lowered by turning it in the desired direction, the action being quick or slow, according to the angle of the threads formed on the tubes, and in connexion with the water cup, they apply a strong spring to exert its force on the inner tube, and counteract its voluntary running down.

BROWN, R. *Improvements in moulding or shaping metals and other materials.* Dated Sept. 16, 1857. (No. 2404.)

This relates to a mode of forming moulds of various kinds for casting articles, especially hollow articles, such as cast iron pots, kettles, goblets, &c. A half pattern only is used for shaping the surface of the sand. This has its flat side coincident with the axial line of the figure which it represents. The operation takes place upon a horizontal metal table, upon which is laid a thin flat plate with a central hole cut in it to the sectional contour of the pattern. The pattern is fitted with its flat side upon the horizontal table, and the half moulding box or flask is then set by proper guiding surfaces upon the table over the half pattern. The sand is rammed in at the top of the box upon the pattern, and then the box is lifted directly off the pattern along with the loose bottom plate, which brings the moulded sand clear away with a good edge. This operation being repeated the two halves so moulded are placed together, forming a complete mould, and so on.

FONTAINEMOREAU, P. A. DE. *An improved railway break.* (A communication.) Dated Sept. 16, 1857. (No. 2406.)

This consists of improved breaks acting against the wheels and rails, and by racks and wheels, the whole being put in action by a single lever. It cannot be described without engravings.

ALCAN, E. *An improved process for refining paraffine.* (A communication.) Dated Sept. 16, 1857. (No. 2407.)

This consists in crystallising paraffine from bisulphuret of carbon, and submitting the mass to hydraulic pressure, so as to remove the impurities that remain dissolved in the sulphuret of carbon.

HAYES, E. *Improvements in winding apparatus for hauling ploughs and other agricultural implements.* Dated Sept. 17, 1857. (No. 2409.)

This consists of an arrangement of drums and pulleys, &c., which cannot be intelligibly described without reference to the drawings.

PULVERMACHER, I. L. *Improvements in apparatuses for creating electric currents, chiefly for medical purposes.* Dated Sept. 17, 1857. (No. 2411.)

This invention is described at p. 5?5 of No. 1819, for June 18, 1858.

GREAVES, H. *Improvements in constructing the permanent ways of railways.* Dated Sept. 17, 1857. (No. 2413.)

This relates to a description of cast iron sleepers which may be used with the present form of rails; likewise to a new mode of connecting the ends of rails to each other. Also to a method of securing the rails to the intermediate chairs or sleepers; to an improvement on a patent granted to the patentee in 1846, for a surface packed iron railway sleeper; and to improvements in manufacturing the same.

SMITH, W. *A novel machine or apparatus for engraving the metallic surfaces of printing rollers or cylinders.* (A communication.) Dated Sept. 18, 1857. (No. 2414.)

This consists in applying an electro-magnetic apparatus for engraving and delineating with a graver or diamond the metallic surfaces of printing rollers or cylinders. The process can be applied to any engraving machine upon the pantographic principle, by the addition of certain mechanical parts.

MUNRO, J. M., jun. *An improved metal wheel-stock.* Dated Sept. 18, 1857. (No. 2417.)

At present some wheel-stocks are made of wood with an oil box in them, and some are made of metal with bolts through them. This invention consists in combining the two systems of bolts through, and oil box in, a metal wheel stock.

DELEVANTE, C. *Improvements in bouquet holders.* Dated Sept. 18, 1857. (No. 2420.)

This relates to a holder of bouquets, capable of expansion to receive the stalks of the flowers, and closing upon them so as to hold them securely. The holder is of a trumpet-mouth form, and has an internal pin which, when the holder is closed, passes between the stalks of the flowers and holds them firmly.

WHITEHEAD, S. *Improvements in trowsers as part of male attire.* Dated Sept. 18, 1857. (No. 2421.)

The trowsers are to be measured and cut at the waist and front about 2 or 3 ins. wider on one side, according to the "dress" of the wearer.

FAULKNER, S. *Certain improvements in machinery or apparatus for carding cotton and other fibrous substances.* Dated Sept. 18, 1857. (No. 2422.)

This relates, 1. To the series of clearing rollers employed in connexion with the main and finishing carding cylinders, as described in the specification of a patent of

the patentee's, dated 25th July, 1843, and is also applicable to other carding engines wherein small card rollers are employed. The improvement consists in mounting a convenient portion of the said card rollers in a separate framing or segment peculiarly fitted. 2. To the construction of the cylinders employed in carding engines. The cylinder is constructed of wrought iron plate, not turned on the outside, and having the ends so shaped as to fix into or over each other, and form an even lap joint. These ends are then secured by riveting.

WATSON, R. *Improvements in the manufacture of heddles or healds for weaving.* Dated Sept. 18, 1857. (No. 2424.)

This relates to a mode of manufacturing heddles or healds for weaving wire. An open barred frame with end pivots or centres is used. This is of a width equal to the length of the heddles, and has set up alongside and parallel with it a screw spindle of the same length. This spindle carries at one end a pinion in gear with a spur wheel on one end of the frame spindle, so that, as the frame revolves, the screw turns also at a rate predetermined by the gearing train. The screw has upon it a traversing nut carrying a guide for the wire of which the heddles are to be made.

WILSON, T. *An improved boot and shoe cleaning apparatus.* Dated Sept. 18, 1857. (No. 2425.)

This consists of certain mechanical arrangements in combination with revolving brushes of suitable forms for cleaning boots and shoes.

LICHTENSTADT, D. *Improvements in the manufacture of pulp, of which paper and other fabrics are composed.* Dated Sept. 18, 1857. (No. 2426.)

This consists in using leather or any kind of animal fibrine in large or small pieces, shavings, or shreds. To extract the tannin from leather it is heated with caustic lime, mixed with ammoniacal compounds. After this the fibrine should be washed with acid, and then in clean water, well pressed and dried. It can then be made into pulp in the usual way.

DERING, G. E. *Improvements in laying down electric telegraph cables, in obtaining soundings, and in ascertaining the position of and raising submerged electric telegraph cables and other bodies.* Dated Sept. 18, 1857. (No. 2428.)

1. The patentee employs self-acting governors to regulate the breaks similar to steam engine governors. 2. He employs similar governors to moderate or withdraw the breaks when the cable is subjected to undue strain. In some cases, he combines the functions of both in the same apparatus. 3. He employs sheaves for the cable to pass wholly or partly around, so held in position by springs, that they will gradually yield as the strain increases; and, in yielding, increase the force of the breaks. 4. In order to accommodate the action of the breaks to the pitching of the vessel, he employs weights, acting, or ready to act, in opposition to springs. 5. For regulating the delivery of the cable, he employs fans, put in motion by the descending force of the cable, and moving either in the air or in water. And, in some cases, he employs, similarly, pumps tending to produce a vacuum. 6. He employs revolving drums of conical form, around which to pass the cable, breaks being applied to the drums. 7. He employs friction breaks pressing directly upon the cable, &c., itself, or against which it is pressed, to moderate or stop its descent into the water. 8. He employs self-acting bells to give notice if the cable is subjected to undue strain. 9. He employs parachutes, having, in one direction, but little resisting vertical surface in proportion to the horizontal area, and buoys for moderating the descent of the cable, &c., whilst presenting but a small surface to horizontal currents. His improvements consist next in methods of ascertaining the position of, and raising submerged telegraph cables, &c. 1. He makes use of conductors for electrical communication, or pipes for pneumatic or hydraulic communication between the grapnel and the vessel; and like means to indicate from below the amount of strain exerted, or to give notice if it exceed a definite amount. 2. He forms the cable by which the grapnels are dragged of gradually increasing size or strength from the grapnel end. 3. He employs anchor-like grapnels having the stock behind the arms. 4. He employs grapnels having jaw-like and spiked or barbed apertures, of such form that a cable will be held firmly therein, or as readily to sever a cable. 5. He employs grapnels of the various kinds above described with the addition of means of closing the jaws upon an object entering them. The invention consists, lastly, in obtaining soundings, especially in deep water, by the use of an apparatus constructed upon principles analogous to the "Aneroid barometer."

WEBSTER, T. *Improvements in the permanent way of railways.* (A communication.) Dated Sept. 18, 1857. (No. 2430.)

This, which relates to railway chairs, switches, and crossings, cannot be described without engravings.

BURTON, J. W., and G. PYE. *Improvements in the construction of rollers used*

for pressing fabrics and fibrous and other materials. Dated Sept. 18, 1857. (No. 2431.)

This consists in constructing the interior surfaces of such rollers of rings of hard compounds of india-rubber or gutta-percha. The surfaces of the rollers under the rings, being coated with vulcanised india-rubber, give flexibility and elasticity to the hard rings.

BESSEMER, H. *Improvements in the manufacture of cast steel.* Dated Sept. 18, 1857. (No. 2432.)

These relate to the apparatus employed in the manufacture of cast steel direct from molten crude iron, by currents of air, used alone or with other bodies, and consist—1. In melting the crude or pig iron in a cupola furnace with desulphurised or prepared coke, anthracite, coal, wood, or charcoal, so as to prevent the deterioration of charcoal pig iron by contact with sulphur. 2. In separating the granular metal from the cinder, which is thrown out of the converting vessel during the "boil" by crushing the cinder in a revolving vessel, and at the same time blowing a jet of air through the axis, so as to separate the powdered slag from the metallic particles. 3. In causing the air, &c., used in the converting operation to enter the molten metal through a single tuyere, situated near the central and lowest part of the converting vessel, such opening serving also as a discharge aperture for the molten steel.

RIGG, A., sen., and A., jun. *Improvements in preparing, sawing, planing, grooving, tongueing, moulding, mortising, and tenoning wood, part of which is applicable to preparing other vegetable substances.* Dated Sept. 18, 1857. (No. 2433.)

This invention was described and illustrated at p. 457 of No. 1814, Vol. 68.

LEVERSON, M. R. *Improvements in the preparation of food for cattle.* (A communication.) Dated Sept. 19, 1857. (No. 2435.)

This consists in mixing hay, straw, and lucerne, chopped small, with oats, bruised or partially crushed, and cementing them together with vegetable mucilage mixed with common salt; then pressing the mixture into cakes.

JAMES, W. H. *Certain improvements in steam vessels, parts of which improvements are applicable to sailing and other vessels.* Dated Sept. 19, 1857. (No. 2437.)

This chiefly consists in forming the hulls of steam vessels of long hollow cylinders united together side by side.

PEAKE, W. H. *Improvements in the construction of beams, girders, and bridges.* Dated Sept. 19, 1857. (No. 2439.)

A series of bars and plates of iron are built one on the other, and bound together by bolts.

ORMSON, H. *An improvement in the manufacture of cast tubular boilers.* Dated Sept. 19, 1857. (No. 2441.)

This is applicable to boilers used for circulating hot water in buildings, and consists in causing the upright tubes and the lower hollow ring (which connects the tubes together at their lower ends) to be all cast in one casting. The upper ends of the tubes have also part of the hollow ring, which forms the upper water space, cast with them.

MINNITT, J. *An improvement in extracting grease from animal refuse resulting from the manufacture of glue and from fellmongers' processes.* Dated Sept. 19, 1857. (No. 2442.)

This consists in boiling the refuse known as glue manure and fleshings, and other like refuse, from fellmongering and like operations, and consists of animal substances combined with lime, &c., with mixture of sulphuric acid (1 lb.) with water (one gallon) so as to extract the fat for the manufacture of soap, candles, &c. Heat is applied by means of a jet of steam at the bottom of the vessel, for about four hours, until the fat is separated from the refuse. The fat is then skimmed off and washed.

JOLY, P. F. *Improvements in apparatus for generating and superheating steam.* Dated Sept. 21, 1857. (No. 2443.)

This relates to a steam generator, composed of, 1. Several series of boiler tubes, closed at their lower part, and suspended vertically above the fireplace by a metal plate. 2. Several series of tubes for superheating the steam similarly suspended, and all abutting in a reservoir at the extremity of the generator, and on the top of which are placed the steam pipe, the pipe of the pressure gauge, and the blowing out pipe for cleaning the generator. Other parts are included, and a condenser constructed similarly to the generator is also to be employed.

SCHAUB, G. *A new or improved manufacture of rollers or cylinders, with patterns or designs thereon, for printing fabrics and other materials.* Dated Sept. 21, 1857. (No. 2445.)

The patentee claims, manufacturing rollers or cylinders by depositing copper in the interior of a hollow metallic cylinder, which is composed of portions carrying on their ends the pattern or design to be reproduced in the copper deposit, the said copper deposit or cylinder being strengthened and made up into a printing roller or cylinder in the manner described. The in-

vention cannot be described more in detail without engravings.

WEST, E. B. *Improvements in the manner of preparing and applying materials used in brewing to that purpose, and in the various processes and apparatus used in connexion with the same, and for novel apparatus connected with the same.* (A communication.) Dated Sept. 21, 1857. (No. 2448.)

This consists in using malt or grain ground as fine as can be without losing any of the flour. This is introduced into a pan with a false bottom, under which liquor is admitted from a boiler, and by degrees rising through the holes in the false bottom, soaks through and mixes with the ground malt, which must be carefully mashed and allowed to stand alternately. The goods having thus been mashed sufficiently, and heat being applied, they must be allowed to come to a slow simmer by degrees in this same pan, which is to be maintained for three hours, certain covers preventing all escape of aroma during that time. The wort is then run into the wort copper to be boiled with the hops, when the cover may again be used. The wort, when run out of the simmering pan and out of the wort copper, will be found properly strained by the strainers. The hops may be boiled separately, and the extract therefrom added to the wort, which may be afterwards cooled, fermented, &c., by the ordinary processes.

ABSTERDAM, J. *A certain new and useful improvement in electric telegraphic cables.* Dated Sept. 21, 1657. (No. 2449.)

This consists in an electric telegraph cable constructed with corrugations or flexures to enable the cable, when subjected to a strain, to have an elastic property, such as will permit it to extend.

FORRESTER, D. *An improved fastening for securing watches, &c., worn on the person, whereby the same are rendered safe from robbery, to be called "Forrester's Patent Watch and Property Protector."* Dated Sept. 22, 1857. (No. 2451.)

This invention was described and illustrated at p. 440 of No. 1813, Vol. 68.

THEILER, M. *A direct printing telegraph without relays and local battery.* (A communication.) Dated Sept. 22, 1857. (No. 2453.)

This resembles a Morse's telegraph apparatus, in that by it the signals are received and registered as a series of marks formed on a strip of paper which passes at a uniform velocity through the apparatus. In Morse's apparatus the lever which carries the marking instrument is brought down upon the paper by an electro-magnet; but like this lever is actuated by a train of wheels, &c.

LAWSON, R. *Certain improvements in apparatus for regulating the admission of air to furnaces.* Dated Sept. 22, 1857. (No. 2456.)

This consists in the application of a "disc valve" to the doors of furnaces, and in opening and closing it by clockwork.

HUGHES, H. *Improvements in machinery for cutting, embossing, and stamping.* Dated Sept. 22, 1857. (No. 2457.)

This, as far as the cutting is concerned, consists in the employment of hardened steel cutters fixed in a strong slide or plunger made to move up and down, and to descend upon a flat hardened steel bed, with considerable pressure; also, in the employment of an endless belt armed with points to receive and feed the material under the cutters. As far as it relates to embossing and stamping, it consists in the employment, in connexion with embossing or stamping plates, of an expansible skeleton feed and tension belt of the construction before referred to.

RENNIE, G. *Improvements in vessels for war and revenue purposes.* Dated Sept. 22, 1857. (No. 2458.)

This relates to certain combinations effected in the construction, equipment, and mode of working steam-propelled boats or vessels for navigating shallow rivers, and intended for war and revenue purposes, and consists, 1st, In the construction of iron vessels of small but sufficient internal depth, with a flat floor, and full round bottom and sides, and proportionately wide beam, so as to combine, for a given length, small draft with stability. 2d. In the disposition, in a vessel so constructed, of two screws, one on each side of the stern. 3d. In the disposition of the engines, by placing the steam cylinders of one engine in advance longitudinally of the cylinders of the other engine, and on the opposite side of the keel line. 4th. In the disposition of the coal bunkers and the boilers, the said bunkers being on each side of the boilers, or boiler and engine space, and partially projecting thereon as a protection thereto.

NEWTON, A. V. *Improvements in obtaining photographic pictures.* (A communication.) Dated Sept. 22, 1857. (No. 2459.)

These cannot be described without engravings. The patentee claims adapting to the photographic camera a lens and reflector in rear of the object glass, in such manner that the instrument may be made to answer the twofold purpose of a camera obscura and a camera lucida.

NEWTON, W. E. *Improved machinery*

for forging metals. (A communication.) Dated Sept. 22, 1857. (No. 2460.)

This consists in improvements applicable to the machines for which letters patent were granted to W. E. Newton, 21st Oct., 1856. They cannot be described without engravings.

BAKEWELL, F. C. *Improvements in the preparation for use of caustic alkalies.* (A communication.) Dated Sept. 23, 1857. (No. 2463.)

This consists in the use of certain airtight cases for preserving caustic alkalies from the action of the atmosphere.

JOHNSON, W. B. *Improvements in raising and lowering trucks, carriages, engines, or other such railway appendages, from one level to another.* Dated Sept. 24, 1857. (No. 2469.)

The patentee claims, 1st, the use of the direct action of steam, hydraulic, or pneumatic pressure for the purposes set forth. 2d. The use of stops acted upon by the ascending or descending load for cutting off the source of power and exhaust. 3d. The use of india-rubber abutments for the upper and lower situation of the platform, whether such abutments be used with direct-acting motive power, or with other machinery employed for the purpose.

LAUGERE, A.V.A. *Improvements in windmills.* Dated Sept. 24, 1857. (No. 2471.)

This relates to horizontal windmills, and has for its object to utilise the full power of the wind, without the necessity of turning the mill according to the variation of the wind. The details adopted for this object cannot be described without engravings.

BARBER, J. *Improvements in machinery or apparatus for manufacturing rollers or cylinders used for printing and embossing woven fabrics, paper, leather, and other materials.* Dated Sept. 25, 1857. (No. 2474.)

The patentee makes the said rollers or cylinders of two separate tubes, the inner one of iron, and the outer one of copper, brass, composition, or other suitable metal, by means of certain described processes and apparatuses.

KELSHAW, J., and J. WILKINSON. *Improvements in self-acting couplings for railway carriages and engines.* Dated Sept. 25, 1857. (No. 2475.)

This consists in the combination of apparatus so that when one carriage is pushed against another it will connect itself with the other. The patentees arrange the draw bar at one end of the carriage so as to be capable of vibrating upon a pivot, and counterbalance it with weights or springs to keep the coupling end in a central position when disconnected. To the other end of the carriage they apply a funnel-formed socket to the draw bar, which will guide and receive the end of the other or first-named draw-bar.

NEWTON, L. *Improvements in the mode of placing tubes on the spindles used in spinning machinery.* Dated Sept. 25, 1857. (No. 2476.)

Instead of placing each tube on its respective spindle in a mule or other machine by hand, the patentee places the whole of them on simultaneously. To effect this he employs a frame with the requisite number of holes to contain the tubes corresponding with the number of spindles in the machine.

NEWTON, A. V. *Improvements in rock-drilling machinery.* (A communication.) Dated Sept. 25, 1857. (No. 2479.)

This consists in improved means for operating the drill, giving it its reciprocating motion, and rotating the same intermittently. Also in an arrangement of the frame which contains the working parts, and by which the said parts are adjusted to work at different angles. These improvements cannot be described without engravings.

JACKSON, J. *Improvements in the manufacture of tyres for railway and other wheels.* Dated Sept. 25, 1857. (No. 2480.)

This consists in casting in a mould a circular mass of steel, plain on its edge, if an ordinary tyre is to be made, or flanged if a railway tyre. From the centre of the mass so cast a circular piece is cut or punched by suitable tools, and the ring of steel thus obtained is extended by passing it between rollers arranged like those used for extending and finishing ordinary welded up tyres.

CHUBB, J. *Improvements in the construction of iron safes and doors for strong rooms.* Dated Sept. 25, 1857. (No. 2481.)

This invention was described at page 180, No. 1802, Vol. 68.

LEWIS, J. *Certain improvements in machinery or apparatus for making bricks, tiles, and other similar articles, and also in the machinery for preparing clay for the same manufacture.* Dated Sept. 26, 1857. (No. 2484.)

This relates to improvements upon an invention for which letters patent were granted to W. Grimshaw and E. Rowland, 7th Sept., 1853, the principal object being to make bricks of dry clay by compression in a mould by the direct action of steam power.

WATSON, R. *Improvements in weaving.* Dated Sept. 26, 1857. (No. 2485.)

Here the usual overhead shafts with their belts and driving pulleys are all dispensed with, and their place is supplied by long horizontal reciprocating bars or shafts carried in bearings beneath, or on a level with, the floor of the weaving shop. These are each driven from one end, one such bar or shaft being provided for each row of looms, disposed beneath the centre of such row. Other parts are included.

HENRY, M. *Improvements in the manufacture of artificial wine, vinegar, and brandy, part of which improvements is applicable in the manufacture of brandy generally.* (A communication.) Dated Sept. 26, 1857. (No. 2486.)

This consists in forming a mixture of the constituents of grape juice, for the production of artificial wine, and adding ingredients for giving the required flavour, aroma, or bouquet and colour. Also in the preparation of artificial vinegar from such wine in the usual manner; and, further, artificial brandy by distillation of artificial wine.

SPEIGHT, G. *Improved head plaits, foundations for wigs, bracelets, and other plaited ornaments for personal wear.* Dated Sept. 26, 1857. (No. 2487.)

This consists in manufacturing such plaits, &c., of dyed Manilla hemp, or of dyed jute, or of the two combined. The hemp or jute, having been dyed of the desired colour, is combed out, receives a gloss, and is worked up into plaits for the purposes stated.

CRICK, T., and J. T. *Improvements in the manufacture of boots, shoes, and slippers.* Dated Sept. 26, 1857. (No. 2488.)

These consist, 1st, in a mode of attaching the upper leather to the inner sole. The patentees make holes round the lower edge of the upper, and lace the same with thread, cord, or other material, so as to draw it together, so that when the last, which is of metal, and has the inner sole attached to it, is inserted, the lower part of the upper extends or laps over the edges of the inner sole. The sole is then laid on to the inner sole, and is attached to it by nails, pegs, sprigs, or rivets. Another part consists in finishing the outer sole before attaching it to the inner sole.

BOWLER, W. *Improvements in the manufactnre of hats and other coverings for the head.* Dated Sept. 28, 1857. (No. 2493.)

The body of the hat is here made large, and so as to contain within it a ring or band to fit the head of the wearer, which ring or band is attached to the body by a connecting piece of an annular form, and this connecting piece may be continued so as to project beyond the body, and form a brim.

WHITE, W. W., and W. BULL. *Improvements in rollers applicable for blinds, maps, and other purposes.* Dated Sept. 29, 1857. (No. 2498.)

This consists in the use of an india-rubber or other spring fixed to the framework on which the roller revolves, to which a cord is attached, the other end being passed over or fastened to the wheel on the roller, which has a ratchet for a catch on one side, and a drum (smaller in diameter than the roller). It also comprises the varying of this mode by having a pulley fastened to the spring, the cord fastened to the pulley wheel passing through the pulley, and being fixed to the bracket or framework of the window. Also, the use of these principles without the india-rubber, &c., the roller being made to revolve, and the blind being fixed in any position by a spring on the bracket.

BAYLISS, W. *Certain improvements in the manufacture of chain cable.* Dated Sept. 29, 1857. (No. 2499.)

These relate to the cross-stay or stud that is put between the links. The invention consists in making them hollow, either of drawn tube or of cast malleable or common iron.

SMITH, S. *Certain improvements in coffins.* (A communication.) Dated Sept. 29, 1857. (No. 2500.)

This relates to metallic coffins, particularly to those of cast iron. The coffin is formed in two parts, a top and a bottom, both of which are furnished with projecting flanges, which fit each other. They may be bolted or screwed together through lugs, and, the interstices between the flanges being filled with a cement, an air-tight coffin is produced. A plate of glass is placed over the face of the deceased and furnished with a metallic shutter to be placed over prior to burial. Upon the interior of the lid a perforated box is provided to contain charcoal, from which a tube may pass into the atmosphere outside to carry away offensive vapours.

PEARCE, J. C. *Improvements in apparatus used in hot pressing, and in the means of manufacturing parts of such apparatus.* Dated Sept. 29, 1857. (No. 2503.)

These relate to press plates to be heated by steam, &c., and consist in forming them of two sheets of wrought iron or steel, with grooves or channels, so that, when rivetted, or welded together, steam may be circulated through them. Also in forming the grooves or channels by means of certain described processes. They also relate to the construction of pipes or tubes for conveying heating and cooling media to and from press

plates with folding joints, or a combination of folding and sliding joints. They also consist in supporting press plates at the required distance asunder, when they are relieved from the pressure of the press by means of bolts, hooks, or loops, provided with shoulders, and fitted loosely into suitable holes, slots, or projections near the edges of the plates.

CLARKE, S. *Improvements in apparatus for burning night lights or mortars.* Dated Sept. 29, 1857. (No. 2505.)

A tray with raised sides and a handle receives in the centre of it a small dish containing water in which a night light or mortar is placed. The dish stands on studs. The turned-up edges of the tray act as a gallery for a glass, which is cylindrical, and has a small hole at the domed top. The gallery is perforated with small holes, to supply air to the interior of the glass, which is nearly as large as the tray. The light may be carried about freely.

NEWTON, W. E. *Improved apparatus for igniting gas or other lamps.* (A communication.) Dated Sept. 29, 1857. (No. 2506.)

This consists in combining with a gas or other burner a vibrating electric conductor, which shall pass in close proximity with gas to be ignited, and after producing ignition pass off beyond reach of the flame. Also in letting on and shutting off the gas from a burner by the power of an electro-magnet, combined with a suitable valve for opening and closing the aperture through which the gas is supplied in combination with a vibrating electric conductor.

NEWTON, W. E. *Improved apparatus for measuring gas.* (A communication.) Dated Sept. 29, 1857. (No. 2507.)

This consists in calculating the quantity of gas that has passed through a pipe or vessel of given dimensions, by ascertaining the progressive augmentation or diminution of certain substances when exposed to the current of the gas. This is effected, 1st, by saturating the gas with the vapour of some liquid. 2d. By absorbing the vapour of water contained in the gas by means of some hydroscopic substance. 3d. By the chemical reaction of a portion of the gas upon certain substances, such as chlorine, with which illuminating gas combines and forms Dutch liquid.

JOHNSON, J. H. *An improved hand saw.* (A communication.) Dated Sept. 30, 1857. (No. 2509.)

This consists in so constructing the handle of a hand saw where it is secured to the blade, that a shoulder may be formed on each side of the blade, at right angles to the upper edge of the blade, so that a hand saw and square may be combined in one instrument. The upper edge of the blade may be marked into divisions, and an ordinary scriber may be inserted in the handle, to be taken out, used, and replaced at pleasure.

BOURET, A. *Improvements in Pecqueur's loom for manufacturing fishing and other nets.* Dated Sept. 30, 1857. (No. 2510.)

These relate to a patent granted to O. Pecqueur, 30th Aug., 1849, and consist, 1st, of an arrangement for regulating the delivery of the warp, so as to impart a constant tension. 2d. In causing the warp or shuttle strings to be wound in a vertical direction round their cores, to which latter is given a tapering form towards the point of delivery, so as to permit the strings to deliver themselves uninterruptedly. Each shuttle is provided with a small elastic regulator pressing on the string. 3d. In fixing to the ends of the guide rails, over which moves the reed, fixed curved pieces, the object of which is to insure the proper return motion of the said reed.

PAISLEY, J., and G. BERTRAM. *Improvements in the manufacture of paper.* Dated Sept. 30, 1857. (No. 2512.)

This consists essentially of a mode of preventing the undue waste of the raw or partially manufactured material. The escaping water charged with fibrous matter is conducted by a suitable branch pipe into the open smaller end of a hollow permeable rotary cone, set horizontally in bearings. This hollow cone is composed of two end rings, with connecting links or bars carrying an internal wire cloth, or permeable lining. As the fluid is supplied into the rotating cone, the clear water is discharged through the permeable material, and flows away as waste, whilst the fibre is retained within the cone, and finally discharged at the wide end into a receiver, and is again used in the manufacture.

THOMPSON, E., and W. J. NICHOLSON. *An improvement in railway switches.* Dated Sept. 30, 1857. (No. 2513.)

This consists, 1st, of a mode of constructing apparatus by means of which the tongue rails of railway switches or points are moved, or have their movements and positions regulated as required. 2d. In attaching check rails or guards to the points of tongue rails, so that when a tongue rail is open, the check rail or guard prevents the wheels of carriages from quitting their proper track along the line. The apparatus which the patentees employ in performing the first part of the invention is constructed so as to have the effect of lifting the moveable ends of the tongue rails up from the basis of the chairs within which they traverse laterally when they are removed from

or into contact with the line of fixed rails, thus diminishing the danger of tongue rails sticking fast.

CREEKE, C. C. *Improvements in the construction or manufacture of earthenware pipes.* Dated Sept. 30, 1857. (No. 2514.)

Instead of making the pipes of equal thickness throughout, the patentee proposes to flute them, or to give their outer surface corrugations or flanges to add to their strength without adding to their weight. The junction of the pipes is made by forming an annular groove at each end of the tube for receiving one half of a projecting flange or metal ring, which must be perfectly imbedded with red lead.

SANDILANDS, W. *Improvements in chimney cans or apparatus for promoting draught in chimneys.* Dated Sept. 30, 1857. (No. 2516.)

The main shell of the improved can consists of a cylindrical metal tube, the upper end of which is encircled by a short length of wider tube, which stands up above the central tube, and is bell-mouthed at its open top. This shorter piece of tube is attached to the main tube by open stay pieces, leaving a passage for air between the two. The end of the main tube is sheltered by a conical cap, with its small end upwards. This conical cap is placed at some little distance above the main tube. Down draughts are thus prevented.

HENDERSON, W. *Improvements in treating certain ores and alloys, and in obtaining products therefrom, and in recovering or reproducing all or part of the materials used.* Dated Sept. 30, 1857. (No. 2517.)

The objects of this invention are set forth in the above title; its details would occupy more space than we can afford them.

HARRIS, J. *Improvements in and connected with cocks and valves, especially adapted to preventing the bursting of water-pipes from frost.* Dated Sept. 30, 1857. (No. 2518.)

One of the main features here consists in providing a valve or passage for the admission of air into pipes in which water has been led—say, for instance, from a main into a house cistern—in order to drive out the water therefrom as soon as the supply is cut off, to prevent the bursting of the pipes by the freezing of the water therein; and this the patentee effects by certain arrangements of cocks and valves, or by fitting at the upper part of the pipe, or behind a ball or other cock, a valve opening inwards to allow of the entrance through it of air. The arrangements of cocks and valves consist mainly in so fitting them that, supposing water be turned on from a main by means of any of the cocks or valves, one movement of a lever to a given distance will shut off from the main, and by moving the same lever a little further in the same direction the services will be emptied or allowed to flow out. The improvements are also applicable to bib cocks, and to cocks and valves suitable for boilers, for water gauges, and for supplying baths.

WARD, J. *Improvements in pumps applicable for mines, ships, and other purposes.* Dated Oct. 1, 1857. (No. 2519.)

These improvements are based on the law of atmospheric pressure, that by producing a vacuum in the upward stroke, the fluid will rise to an equivalent height, and by producing a vacuum in the downward stroke, the power finds an equivalent in the weight of the rods, gearing, &c. This action is here multiplied by continuous cylinders and connections placed beneath each other, and is applicable for all purposes where the lifting of water is required.

LONG, J. and J. *An improved method of and apparatus for ascertaining and registering the depth of water and the pressure of steam.* Dated Oct. 1, 1857. (No. 2520.)

This consists in the employment of air and water in a tube so that the pressure, being made to act upon the air in the tube, compresses the air, and forces it up in the tube to a greater or less height according to the pressure brought upon it. A float, being inserted in the tube, is carried up by the liquid, and indicates upon a graduated scale the pressure of the steam or the pressure exerted by the depth of water measured.

LEIGH, E. *Certain improvements in machinery or apparatus used in spinning and preparing cotton and other fibrous substances, parts of which are also applicable to machinery or apparatus generally.* Dated Oct. 1, 1857. (No. 2521.)

This consists of an extension of the principle or improvement, for which the patentee obtained letters patent 2d Sept., 1857, to all purposes where the lubricating matter has to be applied to machinery working horizontally.

JENNINGS, J. C. *Improvements in the manufacture of articles used for forming flues and air and water passages in buildings.* Dated Oct. 1, 1857. (No. 2522.)

Here cast iron trimmers with flanches and recesses to receive the joists are made with air passages through them, so that any air admitted between the floors by air bricks, &c., may pass freely through such trimmers. Hollow blocks of earthenware are used below the hearths, so that the passages through them correspond with the air passages in the trimmers. From the

ends of such blocks proceed like blocks, which rise up the sides or the backs of the flues or chimneys corresponding with hollow passages for connecting the horizontal and upright blocks. Part of the invention is applicable when making flues and air passages conjointly. For conveying away rain water from roofs, and for ventilating drains, hollow blocks are formed suitable for bonding in with the brickwork of a building, such blocks being of clay expressed through dies or moulding orifices.

NAPIER, J. M. *Improvements in printing machines.* Dated Oct. 1, 1857. (No. 2523.)

This relates to machines in which plattens are used to obtain the impressions, and is peculiarly applicable to machines in which the type tables have horizontal motion; and consists in the arrangement of knuckle joints actuated by a crank or eccentric action, by means of which the necessary rising and falling motion is imparted to the platten, and the friction and tensional strain are reduced.

HAMILTON, S. D. *Improvements in Jacquard machinery.* (A communication.) Dated Oct. 1, 1857. (No. 2524.)

The chief object here is to reduce the cards to about one-third of the size of those now in use, and thereby to reduce the dimensions of the Jacquard engine in about the same ratio. Also to free the cards from the strain they are subject to in the ordinary Jacquard, by the impact and collision between the needles at the moment the cylinder is beaten up against the points of the needles projecting through the holey board.

ILLINGWORTH, A. and H. *Improvements in machinery or apparatus for combing wool and other fibrous substances.* Dated Oct. 2, 1857. (No. 2527.)

This relates to those machines in which a travelling set of fallers or gills is employed. The patentees employ supplementary combs, which enter the material at intervals, so as to effect a more perfect combing, and then withdraw therefrom. They also impart to the usual combs or gills an intermittent motion. Also the invention consists in a method of fixing the teeth of gills and combs where two or more rows are used.

WILLWAY, J. S. *An improved apparatus to act as a gas valve.* Dated Oct. 2, 1857. (2529.)

This invention was described and illustrated at page 343, No. 1809, Vol. 68.

SHIBLES, G. W. *Improvements in arranging and reefing the sails of ships.* Dated Oct. 2, 1857. (No. 2530.)

This has reference chiefly to reefing topsails from the deck. The mast carries in addition to the usual yard a rotary spar, set parallel with the yard, and fitted at each end with a spirally or helically grooved barrel. There are two lifts passed up the mast from the deck through eyes or guides in the top of the mast, the other ends of this tackling being respectively passed through terminal eyes on the yards, and thence wound round the grooved barrels on the spar. It is to this barrelled spar that the upper edge of the sheet is attached, the whole being so arranged that when the spar is turned round in one direction to wind up the sail upon it, the two barrels wind up their tackle in the reverse direction.

KERR, P. *Improvements in preparing and finishing threads or yarns.* Dated Oct. 2, 1857. (No. 2531.)

The object here is the securing of a superior polishing or finishing action upon the yarns or threads by means of the conjoint action of frictional tension and heat.

GREEN, R. *Improvements in raising or forcing liquids.* Dated Oct. 3, 1857. (No. 2535.)

This consists in the application of steam acting on air in a closed cylinder in which a vacuum is produced, to raise the liquid into the closed vessel, and from which the liquid is forced by the pressure of the steam and air.

RILEY, W. and T. *Certain improved means, machinery, or apparatus for "saving" or covering the lists of textile fabrics previous to the dyeing of such fabrics.* Dated Oct. 3, 1857. (No. 2537.)

This relates to the covering of the lists or edges of textile fabrics to prevent their taking the dye during the process of dyeing, and technically known as "saving." On a framework the patentees arrange rollers, over which the fabric is caused to travel with the webbing to guides, which in succession turn up the edge or list of the fabric and webbing, and by degrees form a fold on the edge of the fabric, with the webbing outside, thus forming a binding or covering to the list. Reciprocating motion is given to a needle supplied with thread, which passes through the fabric at or about the inner edge of the fold, when a fork, &c., takes hold of the thread and holds it until the needle is withdrawn, and which then carries the thread in a loop around the fold to a point on the other side, where the needle will pass through the loop previously to its next insertion into the fabric, and thus links the last stitch with the succeeding one, the fork, &c., again taking hold of the thread when passed through the fabric, carrying it around the edge or list, as before, and so on.

MOLINEAUX, J. A., and J. NICHOLS. *Improvements in pistons for steam engine and other cylinders.* Dated Oct. 3, 1857. (No. 2538.)

This relates to the introduction of holes having separate or connected valves fitting thereon, by which the pressure acting upon the face of the piston is permitted to enter into the annular chamber or space formed by the piston and its cover plate, and behind the packing rings.

NEWTON, W. E. *Certain improvements in machinery for making mould candles.* (A communication.) Dated Oct. 3, 1857. (No. 2541.)

These relate to machines wherein pistons are employed to force the candles from the moulds. It consists, 1. In making each piston in two parts, with a joint to allow longitudinal play between the upper part, which receives the tip of the candle, and the lower part, to which the force is applied to eject the candles from the moulds, so that when the force is first applied the lower parts may move a short distance independently of the upper parts which receive the tips of the candles, and then strike the latter parts suddenly, and with the effect of a smart blow, which will start the candles better than a heavy force steadily applied. 2. In the employment of clamps to lay hold of the candles while the latter are in the condition in which they have been forced from the moulds.

RUBERY, J. *Improvements in the manufacture of certain parts of umbrella and parasol furniture.* Dated Oct. 5, 1857. (No. 2545.)

This consists in the cutting out and forming them with punches and tools fitted to parts, by which they are held so that the up and down motion necessary for them to receive during the processes of cutting out, &c., shall be imparted to them by steam power, by which means the patentee is enabled to produce them more rapidly, and make them more uniform and regular in their general character.

REEVES, C. *A new or improved sword.* Dated Oct. 5, 1857. (No. 2546.)

The patentee claims a sword capable of attachment to guns or muskets, the sword having a half-basket hilt, combined with a solid tang, the basket-formed hilt being in place of the cross bar hitherto employed capable of attachment to guns or muskets.

RICHARDSON, W. and G. *Partly or wholly stopping wheels of carriages of every description when in motion, and such break or breaks to be applied by the motive power.* Dated Oct. 5, 1857. (No. 2547.)

The patentees claim the application of breaks to any description of carriage to be applied at any angle, from 90 deg. to 45 deg., and the same to be applied by, and taken off the wheels by, the motive power, at the pleasure of the person in charge of the carriage, &c., or, if necessary, to apply a spring or springs to force off the break after they have been applied by the motive power. Also a stop, which is applied at the end of the pole by the person driving.

ATKINSON, R. *Improvements in garments as part of male attire.* Dated Oct. 5, 1857. (No. 2548.)

This relates to the construction of a "vest shirt," and consists in combining a vest or waistcoat front with any ordinary shirt, the two being fastened together.

HENRY, M. *Improvements in apparatus or machines for raking and scraping or cleaning roads, streets, ways, and places.* (A communication.) Dated Oct. 5, 1857. (No. 2550.)

This machine consists of a set of scrapers so contrived as to collect the mud, &c., as they are drawn along the road, but working independently of one another, to accommodate themselves to the irregularities of the surface. The scrapers slightly overlap one another, so as to present a continuous working surface, and the two end or outer scrapers are inclined, in order to scrape the mud, &c., towards the centre of the machine.

COMBE, J. *Improvements in machinery for hacking and preparing flax and other fibrous substances.* Dated Oct. 5, 1857. (No. 2552.)

This consists, 1. In the application of presses to that class of hackling machines which cut on one side of the stricks of flax at a time. 2. In applying to hackling mrchines more than one series of gradations of hackles, and in using, for hackling the end portions of the stricks of flax, finer hackles than some of those which follow for hackling the middle portions nearer the holders. 3. In certain improvements in a hackling machine known as the double sheet or Ardill and Pickard's machine. The invention cannot be clearly described in detail without engravings.

REGNAULD, A. V. C. *A universal preservative medicine.* Dated Oct. 5, 1857. (No. 2554.)

This essentially consists in combining various substances with hydrated ether.

CAVENDY, E. *An instrument in taking zenith observations at sea (when the horizon is obscured), of any planet.* Dated Oct. 6, 1857. (No. 2555.)

This consists in the construction of an instrument by and through which an observer at sea, through his quadrant, can ascertain the zenith of a planet when the

horizon is obscured. It consists of a metallic tube, with magnifying and reflecting glasses, and cross wires, running on an universal hinge suspended on a metallic tripod.

PITMAN, J. T. *Improvements in apparatus for making candles and other analogous manufactures.* (A communication.) Dated Oct. 6, 1857. (No. 2556.)

The object here is to simplify, expedite, and cheapen the making of candles, by substituting machinery for most of the hand labour in those parts of the process where it has heretofore been employed, and in dispensing with the great number of candle frames and moulds now required to make a given number of candles.

HUGHES, R. H. *Improvements in hydraulic connections of gas chandeliers, lanterns, or pendants.* Dated Oct. 6, 1857. (No. 2557.)

The patentee provides the fixed tube of the hydraulic "pendant" with a rim, and the outer tube of the moveable part with another rim to act with that on the fixed tube. And he either forms these rims conical or otherwise ground at the parts capable of coming together, or he applies to one or both of them leather packing, which, when the parts come in contact, will prevent the escape of the gas.

BROOMAN, R. A. *Improvements in apparatuses for taking photographic pictures.* (A communication.) Dated Oct. 6, 1857. (No. 2560.)

This consists in a method of taking photographic views and pictures subtending any angle up to 360 deg. on a plane surface, either with or without the aid of a prism or mirror for changing the directions of the rays of light which produce the pictures, in order to obtain either positive or negative images.

FINZEL, C. W., and J. BRYANT. *Improvements in cleansing animal charcoal, and in removing iron and other impurities therefrom.* Dated Oct. 6, 1857. (No. 2561.)

This consists in employing centrifugal force to drive water, heated air, steam, &c., through animal charcoal.

STONEHAM, J., and J. P. LEES. *Improvements in uniting or connecting piping.* Dated Oct. 6, 1857. (No. 2562.)

In order to join and also to cover the junction of the ends of the pipes to be connected, the patentees employ a nut or union, tapped about one half of its length, and slightly conical through the other half or portion, the nut being made of a material harder than the pipes. The end of one of the pipes is placed in the nut or union, and swelled out to fit the conical part; and the end of the other pipe is swelled out by a parallel tool to the size required to form the thread, and by screwing the nut on the end of the pipe a corresponding thread is formed. They place a washer between the ends of the pipes, and draw them firmly together.

ROBINSON, G. T. *A machine for obliterating postage stamps on letters, at the same time stamping the post marks and registering the number of letters so stamped.* Dated Oct. 6, 1857. (No. 2563.)

This machine requires engravings to illustrate it.

KNAPTON, W. *Improvements in gasometers or gas-holders, and in the application thereof to railway and other carriages and ships, for lighting the same with gas.* Dated Oct. 6, 1857. (No. 2564.)

This consists in making gasometers by combining a flexible or elastic material, such as vulcanised india-rubber, canvas, &c., with a rigid material, such as metal or gutta-percha, for dispensing with the necessity for employing a brick tank containing water, &c., for the gasometer cover to work in.

APPLEGATH, A. *Improvements in printing machines.* Dated Oct. 6, 1857. (No. 2565.)

This relates to machines used for printing newspapers, in which the matter is arranged in columns, and consists in arranging the whole of the form on one printing cylinder in such a way that every side of each column is as accessible as when it was arranged on two.

WARBURTON, J. *Improvements in combing wool and other fibres.* Dated Oct. 6, 1857. (No. 2566.)

One part of this invention consists in feeding the wool, &c., into one of the combs, and then lifting up the projecting fringe of fibres, so that the same may pass over the teeth of the other comb where the two combs are in contact, and there pressing the fibres by a brush in amongst the teeth of the combs where in contact, so that, as the combs separate, the fibres may be combed out, and be divided between the two combs, so as to admit of the wool or fibre being drawn out from each of the combs by suitable drawing apparatus. Another part consists in placing numerous slivers of wool or other fibres around a cylindrical or endless holder, arranged to rotate together with the bobbins or instruments on which the slivers are wound. Modified arrangements are included in the invention.

ROMAINE, R. *Improvements in machinery for digging or cultivating land, part of which improvements is applicable to agricultural steam engines generally.* Dated Oct. 6, 1857. (No. 2568.)

These improvements cannot be described in detail without engravings.

GOSSAGE, W. *Improvements in the manufacture of sulphuric acid.* Dated Oct. 8, 1857. (No. 2569.)

This consists in the use of a solution of sulphurous acid, which is converted into sulphuric acid either by exposure to currents of atmospherical air, so as to cause absorption of oxygen therefrom, or the sulphurous acid expelled by heat from such solution may be converted into sulphuric acid in the way usually practised.

BOYD, A. *Improvements in machinery for spinning and doubling.* Dated Oct. 8, 1857. (No. 2570.)

This consists, 1st, in a copping motion or combination of machinery applied to the carriage of a mule or other machine for spinning or doubling, for building the cops on the spindles. 2d. In a regulator or combination of machinery for governing the speed of the spindles of machines for spinning and doubling, when winding on according to the diameter of the cops. 3d. In a combination of parts, applicable to the machines for doubling called "turners," for holding or retaining the yarns during the operation of winding them on the spindles.

FORSYTH, T. *Improvements in the construction of metallic pistons.* Dated Oct. 8, 1857. (No. 2571.)

This consists in attaching to the body or block of the piston a projection, which answers the purpose of the separate stop piece hitherto employed to close the joint of the packing or wearing ring as described in the specification of letters patent granted to the patentee 5th. Jan. 1857.

GRUBB, T. *An improved photographic lens.* Dated Oct. 8, 1857. (No. 2574.)

This lens is a substitute for photographers' "view lenses," and is similar in several respects to them. It has the same general outward form; it is a nearly achromatised compound of two lenses of crown (or plate) and flint glass, the inner surfaces of which are of the same radius, one convex, the other concave, so as to admit of the lenses being cemented as on ordinary view lenses. But the internal construction is essentially different, the crown glass taking the place of the flint, and the flint that of the crown.

MACNAUGHT, W. and W. *Improvements in steam engines.* Dated Oct. 8, 1857. (No. 2576.)

These consist, 1st, in an improved framing for beam engines, in which the beam pedestals are mounted directly on the top of the pillars, the entablature and spring beams being attached to the sides of such pillars. 2d. In a combination, principally adapted for direct acting engines, by which the side walls of the engine house are made more effective in giving steadiness to the working parts than heretofore, whilst the said parts are more accessible. 3d. In means of taking off the pressure from the back of slide valves, by means of a plate and a thin flexible metal diaphragm instead of packing. 4th. In a method of regulating the travel of the slide valves of steam engines, effected by a novel combination of ratchets and wheels in connection with the governor, and actuated by the vibratory action of the working shaft. 5th. In a method of letting off water out of the cylinders by means of a valve which is kept to its seat by the pressure of steam, instead of springs or weights as heretofore. 6th. In a mode of lubricating vertical and oscillating cylinders through the stuffing box of the piston rod, and conveying the lubricant to the circumference of the piston. 7th. In a mode of lubricating vertical or oscillating cylinders, consisting in providing or perforating holes through the "sides" of the cylinder (out of the range of the piston) through which the lubricant is conveyed or conducted by a pipe or pipes to the sides of the cylinder. 8th. In a contrivance for connecting one lubricating "feeder" to two or more cylinders, or two or more points in one cylinder, consisting of a hollow screw with perforations connecting a branched apparatus to the said feeder.

CRAIG, W. G. *Improvements in the manufacture of railway carriage and other wheels formed of cast metal, or having cast metal naves or bosses.* Dated Oct. 8, 1857. (No. 2577.)

The object here is to cast the hole in the nave or boss in which the axle is fixed, and also the key-way or bed for securing the wheel on the axle, so accurately and true as to dispense with boring and key-bed cutting. The invention consists in a construction of core, and in arrangements whereby the core is more accurately formed; the special object being to enable the core when formed to be correctly placed and held; also in arrangements by which the boxes may truly fit each other, and hold the core in its correct position; and in arrangements in the construction of the pattern so that it may be accurately placed in and withdrawn from the mould boxes.

TODD, W. R., jun. *Improvements in manufacturing or preparing washing blue.* Dated Oct. 8, 1857. (No 2580.)

This consists in mixing sulphate of indigo neutralised with an alkali of starch, sago, or other farinaceous matter, soluble in water; carbonate of soda or common salt is also added, and when the mixture is dried, it is reduced to a fine powder by grinding a

small portion of fine smalt blue, or ultramarine blue, or both may also be added.

MASSEY, T., and T. SAVAGE. *An improvement in apparatus for ascertaining and recording the speed of ships.* Dated Oct. 8, 1857. (No. 2583.)

This has for its object an improvement on Massey's patent log, and consists in mounting a bell-formed shield on the rotating axis, so that should the sea-weed become entangled in the joint, and get wound up, so as to fill the shield as the joint and shield revolve together, no inconvenience will result therefrom, and the shield will effectually prevent any piece of weed becoming entangled with the joint, and also with the other parts of the apparatus.

SCOTT, G. *Improvements in steam generators.* Dated Oct. 9, 1857. (No. 2585.)

A generator is composed of a coiled tube, with each end beyond the coil brought in the line of the axis of the coil, and mounted in suitable bearings, so that the entire coil may rotate thereon, as on journals, and in succession present every part of the circumference of the coil to the direct action of the heat in the furnace below, and in the flue leading therefrom.

WALMSLEY, S. *Improvements in the construction of footsteps for upright shafts and spindles.* Dated Oct. 9, 1857. (No. 2586.)

This consists in forming the upper part of the footstep conical, and in connecting the upper to the lower part by holes, so that the lubricating material that escapes from above may descend to the bottom part. The patentee also proposes to make the conical part, or that part of the footstep in which the spindle revolves, capable of being detached from the lower part, to facilitate repairs, and to allow of a piece of glass being placed at the bottom of the footstep.

ALLMAN, F. H. *Certain improvements in the construction of valves and taps.* Dated Oct. 9, 1857. (No. 2587.)

This invention consists of various arrangements in which flexible or elastic fluid-proof material is employed betwen the fluid to be transmitted and those parts of the tap or valve by which it is opened or shut.

HARLAND, J. *Improvements in purifying and cleansing clay, and in the manufacture of bricks, tiles, and similar articles therefrom.* Dated Oct. 9, 1857. (No. 2589.)

The clay is here contained in a travelling box running on anti-friction rollers, and impelled by a rack and pinion, for the purpose of forcing the body of clay against the dies or bars employed for shaping or purifying it. The lid of this box is fitted in grooves, and as the box moves forward the lid is held stationary by bearing against the bars or dies, whilst the box with the clay continues to travel onwards, and forces the clay through the moulding dies or bars. The purifying of the clay is accomplished by forcing it through a grating of any desired degree of fineness, placed either in the lid of the box or at the ends thereof.

NEWTON, W. E. *Improvements in stirrups or stirrup irons.* (A communication.) Dated Oct. 9, 1857. (No. 2593.)

The stirrup strap is passed under a moveable bar, which is jointed at one end to the stirrup iron, so that it is free to turn on its fulcrum when relieved from a retaining bolt or pin which secures its other end to the stirrup iron. This pin is attached to a lever frame, which is hinged to the front of the iron above the foot, and when the lower end of the lever frame is pressed back (as it would be by the foot of the rider, were he thrown from the saddle, and his foot caught in the stirrup) the retaining pin is withdrawn from the strap bar, and the stirrup iron consequently released from the strap.

CALVERT, F. A. *Improvements in machinery for ginning cotton and for burring and cleaning cotton, wool, and other fibrous materials.* Dated Oct. 10, 1857. (No. 2595.)

This consists of improvements upon the machinery for which former letters patent have been granted to the patentee. The surfaces of the cylinders employed are now made with smooth blank spaces between the circular or spiral coils of teeth.

LEROY, C. N. *Preventing accidents and collisions on railways.* Dated Oct. 10, 1857. (No. 2597.)

This relates to certain mechanical arrangements for informing the engine-driver at a suitable moment, by means of visible or audible signals, or by both simultaneously, whether the track in the direction in which his train is running is free, whether the switches are in the required position, or whether any portion of the carriages of the train might have been separated from the rest of the train. The patentee places a series of suitably combined levers along the track of a railway at a suitable distance apart, the said levers being connected together by wire or otherwise.

LOMBARD, G. F. *Improvements in steam engines.* Dated Oct. 10, 1857. (No. 2598.)

This consists in the application of two pistons working simultaneously to the same cylinder, in the coupling or joining of two cylinders to the same engine, the whole in combination with a fly wheel which admits

the steam through its centre, when it has produced its effective work, to act again on its issuing from the periphery of the fly-wheel upon certain inclined planes, similar to such as are used for water wheels, the said inclined planes being arranged in the inside of a box which encloses the fly-wheel.

BARLOW, A. *A jacquard apparatus, dispensing with the use of cards, and the usual mode of designing for figured weaving.* Dated Oct. 10, 1857. (No. 2599.)

The object of the present modification of the jacquard loom is to produce tweels, satins, and grounds by self-acting means, by which contrivance an outline only of the design is required, the repetition and combination of the tweels, satins, and grounds being effected by the machine itself. It cannot be described in detail without engravings.

MYERS, W. H. *An improved means for signals on railways, being a system of signals for railway trains in motion or otherwise, comprising communications between guards and engine-drivers, station-masters, and others, the same apparatus being applicable as fog, danger, and accident signals, the same apparatus being also a communication from station-masters or other servants, including point and signal men, to guards and engine-drivers, for passengers, by means of glass or metallic pendant signals.* Dated Oct. 10, 1857. (No. 2600.)

The patentee arranges a fog and danger apparatus for the purpose of signalling to guards and engine drivers by various means which cannot be intelligibly described without engravings; but the invention mainly consists in arranging a powerful rattle or alarm, which, in case of danger, may be worked or set going by the guard or engine-driver on the train, or, by means of a clip fixed on the rail, by any station-master. Arrangements are also devised for working the steam-whistle in the same manner, and showing different-coloured lights and signals. The mechanism allows of communications being made between guards and engine-drivers or passengers and guards.

PORTER, R. and J. *Improvements in machinery for the manufacture of bricks.* Dated Oct. 10, 1857. (No. 2601.)

The moulds are arranged horizontally around a spindle, and caused to revolve by a star wheel, or tooth gear. They are fitted with loose bottoms, for delivering the brick. These bottoms are actuated by a lever, to which are fitted a sponge, sand, and oiling apparatus, for lubricating the brick mould, and facilitating the easy delivery of the brick. The clay may be prepared in a pug-mill. It is then placed in a box in front of the moulds, into which it is forced from the box by means of a plate attached to a rod worked by a crank or eccentric. The shaft on which the moulds are fixed then performs a portion of a revolution intermittently, whereby the top of the mould, which was presented laterally to the clay whilst receiving it from the box, is brought downwards, and at the same time another mould is brought opposite to the box to be filled. The moulded clay is removed from the bottom mould, which has been filled and moved downwards, by a lever acting upon its loose bottom, which is coupled with the lower bottom of the opposite or top mould, whereby such moulded clay is forced out and deposited upon an endless band running on rollers.

EDWARDS, H. *An improved vessel or feeder for administering food and medicines.* Dated Oct. 10, 1857. (No. 2603.)

The patentee constructs his feeder in the form of a cornucopia, or of an inverted cone, with the apex curved or bent. The large end is closed, with the exception of an aperture for filling, and for regulating the outflow from its narrow and tapered end. This end is furnished with a small orifice, and has fitted to it or not an artificial teat, stop-cock, nozzle, or spout.

PRESTAGE, F. *Improvements in the furnaces of locomotive and other steam boilers.* Dated Oct. 12, 1857. (No. 2605.)

The patentee makes use of a perforated chamber of fire-clay, divided into compartments, and enclosing the furnace ends of the tubes The gases, &c., evolved pass through the perforations, and are met by, and mixed with, currents of air, which effect their combustion.

BEARD, G. *Improvements in mechanism for producing impressions on paper or other surfaces.* Dated Oct. 12, 1857. (No. 2607.)

This consists of a moveable or other pad or inking cushion supplied with ink or colouring matter, and a roller to take up the ink or colouring matter, and press against the die, type, or block; the same to be worked by connection with a plunger, at the end whereof is a receptacle to contain the dye, type, or block. Motion is communicated by the hand applied to a lever, or by engine power.

CALVERT, W. *Improvements in obtaining motive power by the action of the wind.* Dated Oct. 12, 1857. (No. 2609.)

This invention cannot be described without engravings.

BROOKES, W. *Improvements in combing wool and other fibres.* (A communication.) Dated Oct. 13, 1857. (No. 2612.)

The fibre is fed between pairs of rollers

one of each of which pairs has rotary motion given to it, whilst the other is capable of receiving motion therefrom in order to nip and draw forward the fibre; the upper of each pair of rollers is carried by a frame which has a lifting movement given to it, to raise those rollers from the fibre, when the fibre will remain stationary; and to assist the fibres in so remaining, as also to aid in cleansing them, there are comb teeth which rise into them between and in front of these rollers. The feeding of the fibre to the combing means will, therefore, be intermittent. The fibre is fed on to comb teeth and another set of teeth pointing in an opposite direction then penetrates it, when the comb teeth thus holding the fibre recede, drawing out a quantity from that held by the feeding means, and which become cleansed at one end by being drawn through fine teeth in front of the feed rollers. These holding teeth then take the fibre to an endless comb, and they are drawn off therefrom by suitable means.

ALGER, C. C. *An improved furnace for smelting iron.* Dated Oct. 13, 1857. (No. 2614.)

The object here is to produce a furnace for smelting iron, and having a capacity materially increased beyond that of furnaces as heretofore constructed, and at the same time preserving proper relations of the blast to the charge. The furnace is of an elliptical or oblong form in horizontal section, from and including the hearth or crucibles upwards, and having two mouths (one at each end of the hearth) and ranges of tuyeres in each of the two opposite sides, so as to introduce the blast in the direction of the breadth of the hearth.

BELL, T. *Improvements in the manufacture of alkaline salts.* Dated Oct. 13, 1857. (No. 2616.)

This consists in passing the volatile products from the destructive distillation of leather, bones, &c., through vessels containing sulphuric or hydrochloric acid, until the acid is saturated; afterwards the liquid is removed from the vessels and evaporated, so as to cause the sulphate or muriate of ammonia to crystallise. The patentee also proposes to obtain salts of ammonia to crystallise. The patentee also proposes to obtain salts of ammonia from the material used in the purification of coal gas, and consisting of oxide of iron mixed with other substances.

SIMPSON, J. H. *Improved machinery or apparatus for making bands or ropes of straw, hay, or other fibrous substances.* Dated Oct. 13, 1857. (No. 2617.)

This invention relates to an arrangement of mechanism for twisting hay or straw bands, instead of putting the twist into them by hand.

MARTIN, M. *Improved apparatus for retarding and stopping railway carriages.* Dated Oct. 13, 1857. (No. 2618.)

This apparatus consists of an hydraulic apparatus, whereby a brake may be brought to act on the running wheels of ordinary carriages.

KEIGHLEY, E. *Improvement in the preparation and use of dye liquids.* Dated Oct. 14, 1857. (No. 2623.)

This consists in filtering the dye liquids through perforated metal covered with cotton, &c., and fitted to a frame which slides in the dye vat before using them, so as to prevent the irregularities of colour resulting from the unequal distribution of pieces of the dye wood through the liquor while the goods are being dyed, also to prevent waste of dye wood that is not quite spent.

SWINBURN, J. F. *Improvements in fire-arms.* (A communication.) Dated Oct. 14, 1857. (No. 2625.)

This consists in a peculiar mode of constructing the locks of fire-arms, so as to facilitate the action of the main spring on the tumbler, and increase the readiness of the discharge of the tumbler, and with it the lock or hammer.

JOHNSON, J. H. *Improvements in producing figured paper to be used in teaching writing and drawing.* Dated Oct. 14, 1857. (No. 2626.)

This has reference to a mode of producing on paper or other fabrics letters, figures, devices, or designs, to be used as a means of conveying elementary instruction in writing or drawing, by laying the fabric on one zinc (engraved) plate, placing another above it, and subjecting the whole to pressure.

OWEN, E. *Improvements in the preparation and manufacture of manures.* Dated Oct. 14, 1857. (No. 2627.)

This relates to the preparation of manure from brewers' spent hops, and consists in mixing with such hops sulphate of ammonia and nitrate of soda, either alone or together.

HOLMES, F. H. *Improvements in magneto-electric machines.* Dated Oct. 14, 1857. (No. 2628.)

This relates to a construction of rotary magneto-electric machines in which the magnets are stationary, and the helices revolve.

MIDDLETON, J., and W. RYLANCE. *The application of a certain metal or material to the manufacture of shuttles, bobbins, and tubes.* Dated Oct. 14, 1857. (No. 2629.)

The patentees make all kinds of shuttles, bobbins, and tubes of malleable cast iron.

RESTELL, T. *Improvements in breech-loading fire-arms, in projectiles, and in cartridges for breech-loading arms.* Dated Oct. 14, 1857. (No. 2630.)

This comprises several improvements which cannot be described without engravings.

PARKER, J. *An improved method of fixing and working Venetian and other similar blinds used as ventilators or screens, or both.* Dated Oct. 14, 1857. (No. 2631.)

This invention was described and illustrated at p. 367, No. 1810, present volume.

PLOMLEY, J. C. *An improved method of drying malt, hops, and other produce.* Dated Oct. 14, 1857. (No. 2632.)

This invention was described and illustrated at p. 396, No. 1811, present volume.

RHODES, G. *A parabolical or bell-shaped or other shaped camp or field tent without any centre, support, or pole.* Dated Oct. 14, 1857. (No. 2633.)

Instead of using a central pole to take the strain off the tension ropes over which the canvas is stretched, the patentee constructs a frame work of pliable ribs or laths, the upper ends of which are inserted into sockets in a circular head piece, and capable of being readily removed therefrom, while the other ends are passed through loops in an endless band or strap; a parabolic or other frame is thus made, capable of receiving a canvas covering.

WILKINS, E. *Improvements in frames for horticultural and vegetative purposes.* Dated Oct. 15, 1857. (No. 2634.)

This consists, 1st, in making frames or boxes with small openings at the lower part, and in suspending them in an outer frame so as to form a space for the circulation of air or vapour, either cold or artificially heated, around such inner frames. 2d, in making metal frames (for supporting boxes or pots containing plants) in the form of the stem and main branches of a tree by taking moulds from the tree itself and afterwards making castings, either solid or hollow, from such mouldings.

ROOKE, W. A. *Using and employing dextrine in the making and sizeing of paper.* Dated Oct. 15, 1857. (No. 2635.)

This consists in using dextrine either alone or together with any other materials now used in sizeing paper.

REEVES, C. *An improvement or improvements in the manufacture of swords, matchets, and knives.* Dated Oct. 15, 1857. (No. 2636.)

This relates to the manufacture of that part of a sword, matchet, or knife, called the tang. The tangs taper in thickness from their junction with the blade to their ends, and this invention consists in effecting the tapering by the use of a pair of rolls.

BALDERSTONE, R. G. *Apparatus for cultivating land.* Dated Oct. 15, 1857. (No. 2637.)

According to one modification, the cultivating apparatus is fitted upon the framing of a locomotive steam engine, in some respects resembling a railway locomotive. The cultivating mechanism consists of a digger blade or blades or forks attached to a transverse horizontal frame, arranged to work in vertical slots in side pieces fixed to the framing of the locomotive at or near its back end. The frame is made capable of turning, and reciprocates in the vertical slots. The frame and the blades or forks are moved to a certain extent backwards and forwards at the same time that they are raised or lowered. The requisite movement may be imparted to the rod in a variety of ways, several arrangements for which are included in the specification.

RICHARDSON, T., and M. PRENTICE. *Improvements in the manufacture of salts and preparations of phosphoric acid.* Dated Oct. 15, 1857. (No. 2639.)

This consists in effecting the separation of carbonates of zinc and magnesia from coprolites and other substances containing phosphate of lime, calcining them so as to render the lime and magnesia caustic, and then treating the calcined material with water. Also in a mode of preparing superphosphate of lime or other preparation of phosphoric acid for use as a manure from coprolites or other substances containing phosphate of lime, and which have been previously prepared in the way above described.

NEGRETTI, H. A. L., and J. W. ZAMBRA. *Improvements in producing graduated scales, and other signs, letters, numerals, characters, and pictorial representations, upon porcelain and other ceramic and enamelled materials, which improvements are applicable to the graduated scales of meteorological and other philosophical instruments.* Dated Oct. 15, 1857. (No. 2641.)

This consists in producing signs, letters, or figures on the scales of meteorological and philosophical instruments, which are usually painted or engraved, by etching them upon porcelain or other ceramic material, either in the biscuit or other state, by means of hydrofluoric acid in the manner usually practised in etching upon glass.

GIBBS, J. *A method of treating phormium tenax, in order to render it fit for the manufacture of pulp.* Dated Oct. 15, 1857. (No. 2642.)

This consists in subjecting phormium tenax, or New Zealand flax—cut when at

maturity, but while in a green state, and before the leaf is withered or dried—to the action of heavy pressing rollers or cutting machines, to break down the fibre and extract as much of the mucilaginous part of the plant as possible. In all cases the material is to be drained and squeezed, to abstract water and mucilage from the fibres.

HEILMANN, P. *Certain improvements in spinning silk, cotton, wool, and other fibrous substances.* Dated Oct. 15, 1857. (No. 2643.)

This consists in the use of a gummy material or composition for binding together fibres while they are being formed into thread, which may be afterwards wound spirally upon a gathering drum of a peculiar construction, and then allowed to dry. The invention also comprises machinery, which cannot be described without engravings.

SEARR, G., and J. POLLARD. *Certain improvements in power looms for weaving.* Dated Oct. 15, 1857. (No. 2646.)

This consists in the interposition of an extra roller between the ordinary cloth roller and the upper roller, having a roughened surface commonly employed in power looms. This extra roller gives a proper tension to the fabric before it is wound on to the cloth roller, and thereby dispenses with the roughened surface of the top roller hitherto essential.

GUTHRIE, D., and J. VAVASSEUR. *A machine for cutting, chipping, or rasping dye woods, or other similar fibrous substances, for the purpose of obtaining extracts.* Dated Oct. 16, 1857. (No. 2648.)

The patentee claims the putting the cutters on a drum or cylinder to work on a vertical shaft and the placing of several troughs and feeds round the same, having one side bevelled against the drift of the cut.

WRIGHT, J. *Improvements in preparing or treating strips of steel for hardening and tempering.* Dated Oct. 16, 1857. (No. 2649.)

This consists in drawing the said strips through a hot metal or fire-clay tube to heat them, and at the same time applying a sufficient tension to straighten and keep them straight during the operation.

HOLROYD, W., and S. SMITH. *Improvements in looms for weaving.* Dated Oct. 16, 1857. (No. 2650.)

These have for their object the giving motion to shuttle boxes where series of them are used, especially such as are of the rotary character, so that any shuttle compartment of the series may be brought into a line with the lay when desired to change shuttles.

BERNARD, J. *Certain improvements in the manufacture or production of boots and shoes, or other coverings for the feet, and in machinery, apparatus, and materials to be employed in such manufacture.* Dated Oct. 16, 1857. (No. 2651.)

This relates, 1. To certain improvements in that portion of the machinery for pegging boots and shoes for which British letters patent were granted to the patentee, 5th April, 1856, and has reference more particularly to the means employed for presenting the boot or shoe under the pegging mechanism. 2. To a mode of providing right and left boots and shoes alternately from one machine, without changing or adjusting its working parts. 3. To certain improvements in the construction of lasts, for preventing the pegs or other similar fastenings from becoming fixed therein, and for facilitating the removal of the last from the boot or shoe. 4. To a method of strengthening the soles of boots and shoes at the junction of the heel across the waist. 5. To a mode of treating or repairing the continuous lengths of fastenings used in pegging boots and shoes, previous to such fastenings being cut into lengths.

ARBEL, L. *Certain improvements in manufacturing wheels for carriages on railways.* Dated Oct. 16, 1857. (No. 2652.)

This consists in manufacturing such wheels by forming the nave, the spokes, and the felloe separately, bringing them together, or setting them up, in a suitable furnace, and then welding the whole together, with any necessary appendages (such as an eccentric, crank, or other such part) in dies under a steam or other hammer or press.

BADGE, R. J. *An improved mode or method of securing railway chairs to the sleepers.* Dated Oct. 17, 1857. (No. 2656.)

The patentee employs fasteners composed of two or more pieces similar to a mason's lewis, which is used when raising large blocks of stone. The improvement consists in having a compound slot in the direction of their length, into which a metal key of parallel thickness is firmly driven, after the wooden trenail or other side pieces have been driven into their place. The key is furnished with a head, by which it can be drawn out when required.

BENTLEY, J. *Improvements in fire-arms.* Dated Oct. 17, 1857. (No. 2657.)

This relates, 1. To improvements in the locks of fire-arms, whereby the hammer can be raised to half-cock and discharged, or let off by merely drawing the trigger backwards by the finger, as in the ordinary self-acting revolving chambered fire-arms; or the hammer may be placed at half or full cock by the comb of the hammer, as in the

common gun lock; which improvements are equally applicable to repeatiug or single-action fire-arms. 2. To certain improvements applicable to lever ramrods for repeating fire-arms.

EASTWOOD, J. *An improvement in working the valves of steam hammers by a direct self-acting motion.* Dated Oct. 17, 1857. (No. 2659.)

This invention was described and illustrated at page 433, No. 1813, present volume.

BROOMAN, R. A. *Improvements in forming the joints of pipes, for conveying water, gas, and other fluids.* (A communication.) Dated Oct. 17, 1857. (No. 2660.)

According to one of the inventor's arrangements, one of the pipes to be connected is formed with an enlarged end, terminated by a recessed flange, into the recess of which a ring of vulcanised india rubber is placed, and against this ring a circular plate is tightly screwed to the flange. The second of the two pipes to be connected is then forced through the ring, which is of such an internal diameter as to admit it, and grasp it tightly, forming a fluid-tight joint. If the two pipes thus connected are to be subjected to transverse strains, the plate may be formed with a funnel-shaped flange, spreading outward from the packing ring. According to another arrangement, the enlargement of the end of one of the pipes may be dispensed with, and a boxed flange formed on the pipe, into the recess of which flange a ring of vulcanised india rubber is forced, and is there held by the boxed sides of the recess.

MASSEY, T., and T. SAVAGE. *Improvements in sounding machines.* Dated Oct. 17, 1857. (No. 2661.)

This has reference to Massey's patent sounding machines, and consists in fixing to the bar, which carries the lead or weight, guards so arranged as to protect the machine from injury. These guards consist of rings or bands of metal, or, in place thereof, it may be inclosed in a cylindrical cage work of sheet metal, left open at the top and bottom to permit the free passage of water.

OSBORNE, W. *Improvements in ladies' petticoats, under skirts, and dresses.* Dated Oct. 17, 1857. (No. 2662.)

This consists in stiffening ladies' petticoats, skirts, and dresses, by means of thin strips of wood.

CHRISTOFORIS, L. DE. *An improvement in the system of vehicle wheels, to be called the De Christophoris Conical Wheels.* Dated Oct. 19, 1857. (No. 2664.)

The patentee claims the construction and arrangement of wheels of a conical form, and inclined to the plane of the ground at any angle whatever, so as to be enabled to use wheels of larger dimension than usual with proportionably less height.

SIEBER, J. J. *Improvements in power-looms.* (A communication.) Dated Oct. 19, 1857. (No. 2665.)

This relates to an arrangement to cause the power-loom to make 200 strokes in one minute, and consists in a contrivance for stopping the shuttle in the shuttle box, which stoppage, however, is taken off before the stroke is being made; and in the use of a break for the purpose of stopping the loom without any shaking. These improvements cannot be described without engravings.

SCHMIDT, J. *An improved method of making tyres for railway wheels.* Dated Oct. 19, 1857. (No. 2666.)

This cannot be described without engravings.

PEAN, V. *Improvements in protecting the walls, ceilings, wainscoats, and other parts of buildings from humidity.* Dated Oct. 19, 1857. (No. 2667.)

This consists in protecting the walls, ceilings, wainscots, and other parts of buildings from humidity, by coating the same with glass made adherent to sheets of wood by means of a composition which is described.

HENRY, M. *Improved machinery for unmaking rope or cordage.* (A communication.) Dated Oct. 19, 1857. (No. 2671.)

The object here is to perform the first stage of the reduction of old rope to its original fibre, namely, to effect the separation of the strands. It consists in a rotating roller head carrying two feed rollers, combined with a pointed mandril. The rope being conducted between the rollers, the rotation of the rollers in the head drives the rope upon the point of the mandril, while the rotation of the head upon its own axis gives the rotary motion in contact with the mandril in the opposite direction to the lay of the rope.

WIMBALL, H. *Improvements in machinery or apparatus for the manufacure of bricks, tiles, pipes, and other articles of a similar nature.* Dated Oct. 19, 1857. (No. 2672.)

This relates to a peculiar construction of pug mills, suitable either for pugging or working clay, or for making bricks, tiles, and drain pipes, and other similar articles, and mainly consists in the employment of pug mills with two or more shafts and sets of knives, in place of using only one shaft and set of knives, as is at present the case.

COCKEY, E., H., and F. C. *Improve-*

ments in regulating the flow of fluids. Dated Oct. 19, 1857. (No. 2673.)

The improved valve (which may be modified in construction) consists of two cylindrical cases, the faces of which are accurately ground so as to fit gas tight over each other. The lower is subdivided into chambers, by means of radiating divisions, and each chamber is furnished with an outlet or inlet pipe. A small pipe is also fitted into the bottom of each chamber, for drawing off deposits. The upper case is also constructed with chambers, but of a size large enough to embrace any two contiguous cells in the lower box, in which it rests, and turns perfectly gas tight. It will be obvious that any two contiguous cells in the lower case with their respective outlet or inlet pipes can be brought into communication, by simply turning the upper case in one direction or the other.

NEWTON, W. E. *Improvements in the manufacture of drawing rollers.* (A communication.) Dated Oct. 19, 1857. (No. 2674.)

This invention has for its object to divest india-rubber of the power of generating and retaining electricity, and consists in incorporating therewith a portion of pulverised plumbago or black lead previous to vulcanising, the india-rubber being otherwise prepared as at present well known.

BENTHAM, W. *Improvements in harmoniums and other similar reed instruments.* Dated Oct. 19, 1857. (No. 2675.)

This relates to means for producing a "swell" or variation in the tone or power of harmoniums and other similar reed instruments, and in such manner that one part of the instrument, or a series or number of the reeds, can be played piano, or caused to vibrate softly, whilst another part can be played forte or loud, and *vice versâ*; or all parts may be played soft, or all loud simultaneously. The improvements consist in the application of air-tight cells between the wind chest and the reeds of valves, capable of being opened and shut gradually and separately.

PATRIDGE, D. *Improvements in shaft bearings.* Dated Oct. 19, 1857. (No. 2677.)

This is applicable especially to the bearings of the screw shafts of steam-vessels, and to other bearings exposed to water, and consists in coating the shaft at the bearing with tin or soft metal, so as effectually to protect it from the action of the water, and at the same time to give it a surface which turns with little friction in its brasses or supports.

MENNONS, M. A. F. *An improved hydraulic press.* (A communication.) Dated Oct. 20, 1857. (No. 2678.)

This cannot be described without engravings.

ATKINSON, R., and T. BREAREY. *Improvements in looms.* Dated Oct. 20, 1857. (No. 2680.)

The patentees form their picker of hide, sizing, or any like material, each in two or more main parts, one perforated edgewise to slide on the guide rod, and this part enclosed by another piece which passes from one side over to the other, and the whole is cut through from side to side to give lightness, and to lessen the friction on the guide rod or spindle, as well as to admit air to the spindles to keep the picker cool, whilst the upper parts are left to form a handle, around which the picker strap passes in a loop. There is a separate piece of hide applied in front: this is turned over and secured at the sides to receive the blows of the shuttle. When this part wears away it may readily be replaced by another piece.

SMITH, G. H. *An improved governor or regulator for steam and other engines.* Dated Oct. 20, 1857. (No. 2681.)

This consists in the employment of the force exercised by a vane, so applied as to assume a position nearly parallel, to the plane of the direction of its motion when caused to revolve round an axis, for governing the speed of machinery in motion.

WINDHAUSEN, F. *Improvements in increasing the adhesion of the wheels of locomotive engines to rails when moist.* Dated Oct. 20, 1857. (No. 2682.)

This consists in drawing the heated products of combustion from the smoke box of the engine, and forcing them on to the rails in order to dry them.

JOHNSON, J. H. *Improvements in jacquard machines, and in the cards employed therein.* (A communication.) Dated Oct. 20, 1857. (No. 2683.)

This relates, 1. To a peculiar construction of jacquards, whereby very weak springs may be used for operation upon the horizontal needles, to enable paper to be used in the manufacture of the cards. 2. To a mode of treating the paper employed whereby its expansion and contraction are prevented. 3. To a peculiar combination of materials to be employed in the manufacture of the cards of jacquard machines.

TOOTH, C., and W. W. WYNNE. *An improved refrigerator or apparatus for cooling or attempering liquids.* Dated Oct. 20, 1857. (No. 2684.)

This refers "to causing pipes or vessels to move, instead of lying dormant." The patentees prefer rotary motion. They employ suitable liquids or substances moving through them or over them, as the case may be required.

STOREY, I., and J. H. *Improvements in water gauges for steam boilers, and in taps for steam and other fluids.* Dated Oct. 21, 1857. (No. 2685.)

This consists, 1. In the application of valves for admitting and shutting off the steam and water from the boilers to the glass tubes of water gauges. 2. In making the valve spindles of water gauges with a shoulder, and in placing a washer on the valve spindle between the shoulder and the packing to make a tight joint when the valve is opened. 3. In a mode of attaching the glass tube and its guard to the upper and lower mountings of water gauges; and, 4. In making taps for steam, &c., with a plug fitting accurately in a recess, and in opening and closing the tap by moving the plug endwise.

SLAWSON, J. B. *An improvement in boxes for receiving the fares of passengers in public conveyances, for the prevention of fraud on the part of the persons authorised to attend to the receiving of the fares as well as on the part of the passengers.* (A communication.) Dated Oct. 21, 1857. (No. 2687.)

This consists in the use of a box locked, and, if necessary, sealed by the employers, into which it is imperative the passengers shall drop their fare. This box is so constructed that the money shall be arrested by a sliding board until the person authorised to collect the fare shall satisfy himself that the amount is correct by looking through a glass in the front of the box, after which, if correct, he causes it to drop into a box underneath.

NEWTON, A. V. *Improvements in the construction of sewing machines, and in the mode of operating such machinery.* (A communication.) Dated Oct. 21, 1857. (No. 2688.)

This embraces—1. A new stitch made with two threads called a "double back stitch." 2. A machine for making this stitch by means of two needles. 3. A method of making the well-known "tambour stitch," in which one of the above needles is made to operate as a looper. 4. Another method of making the "tambour stitch." 5. An apparatus for producing the "tambour stitch," in which the looper is caught by the thread as the needle rises, and is held to open the loop for the needle to pass through in its next descent. 6. A new machine for making the "double chain stitch." 7. A new apparatus for regulating the length of stitch in that class of machines in which the cloth is drawn through the machine by a weight or the hand of the operator. 8. A novel device for producing the "feed movement" of the cloth in sewing machines.

DUKE, R. *Improvements in the means of communicating power to ships' pumps.* Dated Oct. 21, 1857. (No. 2689.)

This invention was described and illustrated at p. 529 of No. 1817, present Vol.

REEVES, C. *Improvements in repeating or revolving fire-arms.* Dated Oct. 22, 1857. (No. 2690.)

The patentee claims, 1. Holding the cocks or hammers of repeating or revolving fire-arms in the positions of half cock and full cock respectively, and of liberating the said cocks or hammers and discharging the fire-arms, by means of a sear engaging with bents on the lower part of the cock, upon the lower end of which sear the trigger acts, and disengages the sear from the cock, when the trigger is pressed and moved by the finger to its full extent. 2. Connecting the loading piece or ramroad of repeating or revolving fire-arms by means of a certain dovetail slide.

BETHELL, J. *Improvements in machinery or apparatus for trenching, cutting, digging, and cultivating land.* Dated Oct. 22, 1857. (No. 2691.)

This has reference to locomotive apparatus in which rotary cutters or cultivators are employed, and worked by the power which effects the locomotion; and it consists in constructing such apparatus in combination with a self-laying system of roadway for the wheels to run upon.

CHIANDI, A. H. C. *Improvements in the manufacture and combustion of certain products of peat, and in the apparatus employed therein.* Dated Oct. 22, 1857. (No. 2293.)

This consists in producing fuel from charred peat, by soaking it in thick peat tar, and subsequently carbonising it; also in the construction of retorts for performing such carbonisation, so as to condense and collect the volatile substances produced in the operation. High pressure steam is employed in the distillation for regulating the temperature. The invention also includes the construction of a burner for the combustion of peat gas, so contrived as to restrict the supply of air to the flame, thereby retarding combustion, so that carbon is deposited in the flame, and the illuminating effect of the gas increased.

MENNONS, M. A. F. *Certain improvements in machinery for the preparation of peat.* (A communication.) Dated Oct. 22, 1857. (No. 2694.)

This relates to the preparation of peat or turf for fuel, by washing, draining, and compressing it. It consists, essentially, in the construction of the machinery for these operations; and engravings are essential to a complete description of the invention.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

GODET, P. B. *A new mode of illustrating literary productions.* Dated Sept. 16, 1857. (No. 2396.)

This consists in employing photographic stereoscopic pictures taken from groups or scenes formed by living figures or laymen, dressed and combined with the required accessories according to the narratives described in the literary production to be illustrated.

DAVIES, G. *Improvements in the manufacture of cloth or woven fabrics composed of a mixture of wool and a vegetable filamentous material, not hitherto used for such a purpose.* (A communication.) Dated Sept. 16, 1857. (No. 2398.)

This consists in the use for such manufacture of a mixture of animal wool with an exotic filamentous substance or vegetable wool extracted from "jute."

GARRARD, R. *Improvements in the manufactvre of japanned straw hats.* Dated Sept. 16, 1857. (No. 2405.)

This consists in covering straw hats with one entire piece of woven material, without seam, and afterwards japanning such covering to render it waterproof.

LUEDEKE, J. E. F. *A new or improved motive power engine.* Dated Sept. 16, 1857. (No. 2408.)

This consists of an engine, in which a mixture of hydrogen and atmospheric air is exploded, and the partial vacuum thereby produced is made to bring into operation the pressure of the atmosphere so as to obtain motive power. The engine consists of three parts: in the first hydrogen is generated by the action of zinc or dilute sulphuric acid; the gas is transmitted to the second part, where it is mixed with air. By the collapse of the gaseous mixture after detonation a partial vacuum is produced in the third compartment.

HACK, G. F. *An improved cigar tube or holder for smoking cigars or tobacco.* Dated Sept. 16, 1857. (No. 2412.)

This consists in adapting a spring within a tube to hold the cigar or tobacco, which, being lit at the end of the tube is kept at that point by the spring until consumed.

BURLEIGH, B. *Improvements in the mode of laying submarine telegraphs.* Dated Sept. 18, 1857. (No. 2415.)

The inventor constructs water-tight buoys or floats, and affixes them to the cable, either before or during the process of paying out, to relieve the dead weight on the end attached to the vessel.

WEBB, J. *An improved chaff cutter.* Dated Sept. 18, 1857. (No. 2416.)

This consists in the use of an additiona pair of rollers in chaff-cutting machines, whereby the clogging and consequent damage which frequently occur are obviated, or nearly so.

SAVAGE, R. W. *An improved spring and appliances (for carriages and vehicles), which can also be adapted to use on shipboard, or otherwise, to maintain the equilibrium of articles placed on a platform provided with the said improved spring and appliances.* Dated Sept. 18, 1857. (No. 2418.)

The inventor takes rope, or wire, and stretches it to any required tension between standards applied beneath the body of the vehicle, the tension being regulated by stretcher hooks. This rope works upon a friction wheel. Each axle sustaining two wheels will have the above arrangement in duplicate.

IMHOF, D. *Certain improvements in machinery adapted to the exhausting or forcing of air, gases, or vapour, and in the application of such machinery to various useful purposes.* Dated Sept. 18, 1857. (No. 2419.)

The documents relating to this invention are with the law officers under objection. No patent for it can now be granted.

WATSON, R. *Improvements in weaving.* Dated Sept. 18, 1857. (No. 2423.)

This relates to the construction of looms for weaving various classes of goods, by means of several shuttles operating in concert, for the production of various effects in the woven goods. The invention is available for moveable shuttle boxes, both of the rectilinear and rotary kind, and it consists essentially in the adaptation of the slay or lathe action to the shifting of the shuttle box.

ANDERSON, Sir J. C. *Improvements in locomotives and other carriages.* Dated Sept. 18, 1857. (No. 2427.)

This cannot be described without engravings.

SNELL, H. S. *Improvements in apparatus for retarding omnibuses and other carriages.* Dated Sept. 18, 1857. (No. 2429.)

A skid or shoe is fixed on one end of a lever, the upper end of which is capable of rotating round the axle on which one of the wheels turn. This lever is upheld off the road until the horses cease to draw, and the traces become slack, when it revolves, and the skid or shoe descends and passes under the wheel.

NAYLOR, W. *Improvements in power looms for weaving worsted, cotton, silk, woollen, and other fibrous substances.* Dated Sept. 19, 1857. (No. 2434.)

This consists of a turn-table attached to the going part of the loom, with partitions fixed upon it, to form any number of shuttle boxes that are required by the use of the above turn-table. The inventor can move one or more shuttle boxes at once, for arranging shades of colours in the same pattern without stopping the loom. The turn-table is made self-acting.

CAVALERIE, F. *Improvements in motive power engines.* Dated Sept. 19, 1857. (No. 2436.)

This consists in increasing the power obtained from steam, air, or gas, by applying thereto an arrangement of wheels worked by connecting rods!

BROOMAN, R. A. *A method of decomposing soapy wash waters, used in the washing and scouring of wools and cloths, of separating therefrom fatty matters held therein, and of treating such fatty matters.* (A communication.) Dated Sept. 19, 1857. (No. 2438.)

This consists in mixing wash waters with the acid solution of chloride of iron and manganese resulting from the manufacture of chloride of lime, in suitable proportions. After the mixture has been stirred, and allowed to settle, the supernatant liquor is drawn off, and the precipitated fatty substance collected from the bottom of the vat, and allowed to drain. The material thus obtained will be found suitable for the manufacture of carburetted hydrogen gas; or by distillation in retorts, it will yield a dark brown oil, very rich in saponifiable matters, applicable to the manufacture of soap. The residue in the retorts is a light charcoal, containing phosphate of lime, and may be used as a disinfectant, or as manure.

ELEY, W. T. *Improvements in percussion caps.* Dated Sept. 19, 1857. (No. 2440.)

This consists in applying strengthening metal hoops exterior of the percussion caps, to prevent their bursting when forced on the nipples of fire-arms.

GRAY, R. *An improved band or cord to be employed for distending or expanding skirts or similar wearing apparel.* Dated Sept. 21, 1857. (No. 2444.)

This consists in the application of bands or strips of untempered steel, in combination with a band of plaited straw, chips, &c., for extending skirts, &c.

PICOT, L. F. *Improvements in salinometers or instruments for indicating the saturation of water in marine boilers.* Dated Sept. 21, 1857. (No. 2446.)

These consist in so constructing the receiver, and also its inlet of the salt water from the boiler, that the reading of the instrument used in ascertaining the density, and consequently the saltness of the water, may be accurately determined, and easily observed by the steadiness of the instrument consequent on the improved arrangements.

OWEN, E. L. *A new or improved method of propelling vessels.* Dated Sept. 21, 1857. (No. 2447.)

This consists in propelling vessels by the use of long plates of metal immersed in the water, to which an undulating motion is communicated.

PATERSON, J. *An improvement in clasps, buckles, and other like fastenings.* Dated Sept. 21, 1857. (No. 2450.)

This consists in constructing clasps, buckles, &c., with a spring tongue, the free end of which abuts against the inside of the hook intended to receive the other part of the clasp or buckle. This prevents the fastening from becoming unfastened accidentally.

WORSSAM, G. J. *An ink self-supplying pen-holder.* Dated Sept. 22, 1857. (No. 2452.)

This is composed of a cylinder to contain ink; a tube or conductor screwed to the cylinder, to convey the ink to the pen; a valve to regulate or shut off the ink in the tube or conductor, also attached to a plate with a spiral spring; a cap screwed on the end of the cylinder, and connected to the valve or regulator with a plate and spiral spring, for the admission of air into the cylinder, and also to regulate and shut off the ink in the tube or conductor; and an ordinary pen, with a shield to protect it.

HENRY, M. *Improvements in the mode of transmitting motion, especially applicable to apparatus employed in navigation.* (A communication.) Dated Sept. 22, 1857. (No. 2454.)

The object here is to transmit motion to parts of machinery capable of being moved into various positions, or having independent motions; as, for example, to a screw propeller made to assume different angles in regard to the keel of the vessel for steering it. This the inventor accomplishes by forming the propeller shaft in parts, or, using two shafts connected by an intermediate piece or link. Of these parts one is near the steam engine, and the other carries the propeller. The intermediate link or piece takes into eyes in the ends of these two, or is otherwise jointed, so that while it receives rotary motion from the driving shaft, it also follows the varying positions of the propeller shaft.

FORD, J. *Am improved apparatus for marking or scoring at whist and other games, which may be adapted for otherwise*

assisting the memory of the players. Dated Sept. 22, 1857. (No. 24)

This consists of a case or holder in which a piece of cardboard, free to revolve, and having figures marked on the front, is so fitted that it may be readily turned, to bring any desired figure opposite an aperture in front of the case.

Clark, W. S., and B. Moore. *Improvements in machines for cutting splints for friction matches.* (A communication.) Dated Sept. 22, 1857. (No. 2461.)

This cannot be described without engravings.

Bylandt, A. De. *Improvements in propelling ships or other navigable vessels.* Dated Sept. 22, 1857. (No. 2462.)

This consists in adapting a series of plates of metal at the submerged parts of ships, and in forcing the air between them by a steam engine.

Oury, P. *An improved apparatus and method for impressing or marking figures or designs upon silk, cotton, or other suitable substances employed for lining caps, hats, and other similar articles.* Dated Sept. 23, 1857. (No. 2464.)

The inventor employs an apparatus similar to an ordinary stamping press for stamping the figures or designs thereon. He first prepares the silk when requisite by immersion in a solution of gum. He heats the underside of the die by means of small gas jets issuing from a perforated vent pipe, places the silk upon it, and by means of an ordinary screw worked by a handle forces down the presser plate upon the silk.

Fontainemoreau, P. A. L. De. *An improved method of marking paper for postal purposes.* (A communication.) Dated Sept. 23, 1857. (No. 2465.)

This consists in the application of a stamp to every sheet of paper, to indicate the postage.

Murray, A., and W. Pollard. *Improvements in the manufacture of textile fabrics.* Dated Sept. 23, 1857. (No. 2466.)

This consists in forming selvages within the edges of the cloth, to allow of its being split into two or more pieces. The inventors cause two threads for each selvage passing from the warp beam, but independent of the harness, to cross, so as to become twisted together, a shedding motion at the same time allowing the weft to pass between them. One of these threads (for each selvage) is passed through a needle or guide, to which an up and down motion is imparted from the tappet shaft; the other is passed through a needle or guide, to which a vibratory motion is communicated; the former is, therefore, capable of being carried down on one side of the latter, and of being conveyed up on the other side, so as to effect the twisting. The guides they mount upon a bar, so as to be a complete apparatus in itself, and affix it to the loom by bolts.

De la Haye, J.,, and M. Bloom. *Improvements in laying down submarine telegraphs.* Dated Sept. 23, 1857. (No. 2467.)

The inventors render the cable buoyant by means of an external covering of light substance enclosed in strips of calico, fastened on temporarily by glue. On being payed off from the ship the cable floats on the surface of the water, or sinks slowly; but when the ship has advanced a considerable distance the glue gradually dissolves. The external covering separates itself from the cable, and the former rises to the surface, while the latter sinks below.

Power, W. *Improvements in steam-engine boiler furnaces and other furnaces for smoke prevention.* Dated Sept. 23, 1857. (No. 2468.)

In furnaces, bakers' ovens, &c., the inventor provides air channels in the vertical side brickwork or lumps, near the back end of the fire-bars abutting on the fire-bridge, to convey the air up from the ash-pit to the furnace.

Singleton, T. *Improvements in looms.* Dated Sept. 24, 1857. (No. 2470.)

These consist,—1st, in an improved weft motion. 2. In an improved arrangement for preventing the breaking of the twist or yarn when entangled in the rods. 3. In an improved temple adapted for woollens or other fabrics. 4. In an improved preserve and check strap. 5. In an improved picker, composed of wood and buffalo hide. 6. In an improved method of cutting or separating the cloth during the process of weaving. 7. In an improved indicator and step motion, to knock off the loom at given distances as the cloth is woven. 8. In an improved motion for easing the shuttle.

Saunders, T. *An improved tumbler key and lever tumbler lock.* Dated Sept. 24, 1857. (No. 2472.)

The key of this lock is a barrel key, and consists of several tumblers enclosed in a case, so that when the key is put into the lock the pin of the lock is so formed that, on turning the key round, the tumblers of the key fall into their proper position, and act in unison with the tumblers of the lock.

Patterson, A. B. *An improved mode of laying submarine cables.* Dated Sept. 24, 1857. (No. 2473.)

This consists in passing the cable through a buoy of peculiar construction, and in paying it out over a beam arranged to vibrate like a scale beam round a fulcrum, and

having the amount of its motion controlled by springs. The buoy floats upon the water, and is attached to the vessel. It will assist in compensating any variations of strain by becoming more or less submerged, and by changing its distance from the ship.

FORTESCUE, J. *Improvements in the construction of domestic or other fire-places, for the purpose of consuming smoke.* Dated Sept. 25, 1857. (No. 2477.)

The inventor provides an auxiliary flue at the lower part of the back of the grate. About level with the top of the bars is a sliding damper, which, when drawn forward, closes the top of the fire-place, and opens the auxiliary flue, which is provided with a small grating for admitting air. When the fire is lighted, the opening to the ordinary chimney is entirely shut. The damper is drawn over the top of the grate, and thereby the auxiliary flue opened. Thus the smoke is driven over the top of the coals, and down back to the opening at the lower part of the back of the grate, where it is met by the current of air through the small grating, which causes it to ignite and be consumed. When the fire is well got up, the register leading to the ordinary chimney is opened, and the sliding damper pushed back. The grate is provided with two shifting bottoms. When fresh fuel is required an apparatus raises the shifting bottom (with the fire) up, and it is held there by a spring; the same apparatus is then let down, and the other shifting bottom is placed on it, and filled with coals. It is then forced up to the other bottom, which is then drawn out, to allow the live coals to fall on the fresh ones, and ignite them.

GREGORY, J., and W. CRAYMER. *Feathering and adjusting screw-propellers to be used in propelling vessels.* Dated Sept. 25, 1857. (No. 2478.)

This consists of improvements upon a patent granted to W. Craymer, 5th Sept., 1855.

ROBINSON, B. *Improvements in the bodies and jackets of ladies' dresses.* Dated Sept. 25, 1857. (No. 2482.)

These consist in forming them with elastic cords or bands inserted so that the whole body or jacket will expand or contract to suit the figure, and to fit dissimilar figures.

BALBONI, P. *A marine, submarine, and aerostatic propeller, being a new mechanism for propelling steam vessels on and in the water, applicable also to aerostatic purposes, combining speed and safety in steam-boats, and giving the power of directing balloons.* Dated Sept. 26, 1857. (No. 2483.)

This propeller is in the form of an isosceles triangle, and is fixed on a pivot at the acute angle, to the end of an axle. The axle has a longitudinal opening in which it slides backwards or forwards, and forms a fin.

BROAD, J. *The construction of a lamp with two burners and two wicks to produce one flame or two flames, according to its regulation, by generation of gas from all and every sort of oils or spirits, naphthas, resinous and tarry substances, and also from petroleum or earth oils.* Dated Sept. 28, 1857. (No. 2489.)

The inventor fills the supply cistern of his lamp, places his tubes so as to take up their supplies of oil or spirit, or both, by capillary attraction, through wicks reaching within a short distance of the tops of the tubes. The inner tube having a hollow top (button shaped) perforated round the edge for the emission of gas. The outer tube fashioned like the ordinary Argand lamp, but having a metal guard over the top surface. To this surface he raises the wick, and lights it. The heat therefrom acting on the tube and button of the inner burner generates a gas, which escapes through the perforations, and becomes ignited by the flame of the outer tube with which it combines.

KAY, R. *Certain improvements in machinery or apparatus for printing calico and other textile fabrics.* Dated Sept. 28, 1857. (No. 2490.)

This consists in the employment of an endless webb of woollen cloth in place of the calico or other back cloth in ordinary use, such webb passing between the cloth to be printed and the cylinder, and may be used with or without blanket or lapping; and with this is arranged suitable apparatus for washing and drying it as required whilst traversing, before its return to the printing cylinder.

ROBY, G. *Improvements in machinery or apparatus for raising water and employing the same as a motive power.* Dated Sept. 28, 1857. (No. 2491.)

The inventor forms an axis or plug conical on the outside, with a web in the centre, forming two passages, which are connected to two separate fixed tubes or pipes, one the feed pipe and the other the overflow. This plug has two apertures corresponding with the two internal passages. Upon the plug he places a drum, working air and water tight, to which tubular arms are attached, the apertures of which come in communication with the apertures of the plug as the arms revolve, thus bringing each tubular arm in successive communication with the feed and overflow pipes, so that, as each arm comes opposite to the lower aperture of the plug, a syphon is formed,

and when opposite the upper aperture of the plug it forms an inverted syphon. The tubular arms are connected to a hollow rim, having the same number of air and water tight divisions as there are tubes; or they may be attached to collapsing chambers of india-rubber.

BESTWICK, W. *An improved material suitable for skirt springs and other similar purposes.* Dated Sept. 28, 1857. (No. 2492.)

The inventor takes cocoa-nut fibre and covers it with any suitable material in a braiding machine, swivel loom, or other machine.

QUIN, R. *Improvements in the construction of cases suitable for containing photographic and other pictures.* Dated Sept. 28, 1857. (No. 2494.)

The inventor constructs cases so that the picture may be inclosed for protection, as in an ordinary case; also that a picture may, when placed on the table, be supported by the case in an inclined position, so that it may be seen to advantage; and thirdly, that the case with the picture may be hung so as to exhibit the picture as an ordinary picture frame.

BLOUNT, E. M. *Improvements in distilling.* Dated Sept. 28, 1857. (No. 2495.)

This relates more especially to the distillation of fatty substances from schists and other materials, and consists in conducting a current of air, gas, or vapour over the material, so as to carry away the vapour or gas into the condensers or the gasometers; also in cooling the material distilled, so as to prevent the formation of coloured or odorous products, and to produce at the surface of the material such a suction or exhaustion as to mechanically draw away the vapour.

SMITH, E. H. *Improvements in sewing machines.* Dated Sept. 29, 1857. (No. 2496.)

The inventor makes his cams in two parts, to be brought up towards each other until the edges take rollers one above the other on the arm to be moved, the one roller taking one side, the other the other side of the cam, which is to be of larger diameter. The shuttle is formed in an annular shape, and has either a circular or alternating motion, and the inventor causes the needle to continue to rise while the shuttle passes through the loop, so as to lift the said shuttle and avoid friction. He causes the thread to pass out of the shuttle near the point of motion on which it alternates or revolves. Other details are included.

LEJEUNE, E. A. *An improved crupper.* (Partly a communication.) Dated Sept. 29, 1857. (No. 2497.)

This consists in the employment of vulcanised caoutchouc for the manufacture of horses' cruppers instead of leather.

BROOMAN, R. A. *Improvements in raising and lowering weights and bodies in mines and other like places, in ventilating mines, and other like places, and in extracting water therefrom.* (A communication.) Dated Sept. 29, 1857. (No. 2501.)

This consists in the use, in shafts and pits, of atmospheric tubes, atmospheric railways, and in connecting to the arms of the pistons made to work in the tubes a cage or platform for carrying the minerals to be raised, and the men employed. The cage is raised by exhausting the air from the tubes above the pistons, and lowered by admitting air into the tubes above them. Safety breaks are attached to the cage. To extract water from mines, the cage is made with a double bottom and suitable valves. For ventilation, tubes must be led to the parts requiring ventilation, and must be connected with the atmospheric tubes.

WILLIAMS, R. *The manufacturing of soap with materials hitherto not introduced by any person in the chemical combination of various ingredients, when manufactured, known by the name of soap.* Dated Sept. 29, 1857. (No. 2502.)

This consists in mixing with soap obtained in the usual way a quantity of fuller's earth, about equal to that of the fat saponified, and also small quantities of nitrate of potassa and bichromate of potass.

WELCH, J. *Improvements in carriages and portable railways, to facilitate their movement on common roads and other surfaces.* Dated Sept. 29, 1857. (No. 2504.)

The portable railways are composed of an endless chain of rails, each link of which is formed of two bars of iron, rivetted at one end to a foot or shoe, and with a space between them, the other ends forming a joint with the foot or shoe of the next link. The foot projects below the bars and alone touches the ground. It contains on its upper side a groove, of sufficient width to admit the rim of certain conducting wheels. The endless chain is carried round the bearing wheels of the carriage, is laid down before them, and lifted again behind by means of the conducting wheels.

WAINWRIGHT, G. J., and C. T. BRADBURY. *Improvements in machinery or apparatus for making or manufacturing tubes or partial tubes used in spinning and doubling machinery, and for holding the same ready for use, part of which machinery is applicable to making pens, pen-holders, and similar purposes.* Dated Sept. 30, 1857. (No. 2511.)

The inventors fix on a suitable stand

rollers revolving in contact, with a second or sliding motion given to one of them by a cam or tappet. By the first or revolving motion, when the metal is placed between the rollers, it is formed into the proper shape, either tubular or partially tubular, and by the second or sliding motion it is pushed from the machine. They also employ a self-acting feeder. Their apparatus for holding the tubes relates to those used in spinning and doubling machinery, and consists of a table or frame at the front of the machine, with either an aperture or projection opposite each spindle, to each of which they place one of the tubes, so that the operator will have every tube in a position ready to be placed on its respective spindle.

FIRTH, J. *An improvement in metallic pistons.* Dated Sept. 30, 1857. (No. 2515.)

Around the circumference of the metal packing a groove is cut, and a spring ring of metal of small diameter (and, by preference, of brass), is laid in it so as to protrude, and that alone comes in contact with the barrel or cylinder in which the piston works, the object being to reduce the rubbing surface and the friction.

CRISTOFORIS, L. DE. *Regulating the ascent and descent of the railway locomotives on inclined planes, which is to be called the De Cristoforis ascending and descending locomotive apparatus.* Dated Oct. 2, 1857. (No. 2525.)

This invention was described at p. 496 of No. 1789, Vol. 67.

DAVIES, S. *Improvements in apparatus for heating the feed water of steam boilers.* Dated Oct. 2, 1857. (No. 2526.)

To the outside of the smoke box, of the ordinary portable steam engine, the inventor attaches a condenser pipe by means of a stop cock and union joint, that may be shut off at pleasure. He then forms a communication by means of an elbow and branch pipe within the smoke-box between the stop cock and one side of the exhaust passage of the engine, and the operation of the apparatus is as follows:—The outer end of the condenser pipe being inserted into the vessel, and submerged in the water to be heated, and the stop cock opened, the water rapidly attains a very high temperature, owing to a portion of the exhaust steam passing into it.

SHAKESPEAR, H. J. C. *An improvement in the construction of carriages for military and other purposes.* Dated Oct. 2, 1857. (No. 2528.)

This consists of a carriage which has a single wheel placed behind the body. The weight of the load to be dragged is placed between the wheel and the horse dragging it, and the horse is attached to the wheel by shafts and traces.

ENGLAND, J. *Improvements in washing machines.* Dated Oct. 2, 1857. (No. 2532.)

The improved washing machine consists of a rectangular vessel, in which are placed two vertical frames containing transverse horizontal rollers capable of moving on their axes. Between these frames is placed a third frame fitted with transverse horizontal fixed bars. To this frame an up and down motion is communicated. The articles to be washed are placed in the vessel on each side of the middle frame, between it and the outer frames, and the washing action is effected by causing that frame to move up and down.

MACPHERSON, A. *Improvements in the manufacture of fences.* Dated Oct. 2, 1857. (No. 2533.)

This relates to a simple and cheap arrangement of apparatus and materials for the manufacture of fences. The materials employed are rope or spun yarn, with transverse rails or bars of wood interwoven therewith.

JOHNSON, J. H. *Improvements in the construction of iron bridges.* (A communication.) Dated Oct. 2, 1857. (No. 2534.)

This relates, 1. To the construction of truss frame girder bridges, and consists of so constructing the upright parts thereof that they may be free to rotate in the upper and lower chords. 2. To improvements in suspension bridges, and consists in using the upright posts similar in construction to those used in the improved truss frame girder bridge.

DYSON, J., E. W. SHIRT, and H. SHIRT. *Improved straps or driving-bands for machinery.* Dated Oct. 3, 1857. (No. 2536.)

This relates to the use of rolled sheet steel iron, or other metallic substance for straps or driving bands to transmit motive power.

CHOWEN, G. *Improvements in the arrangement and construction of fog, wreck, and other buoys.* Dated Oct. 3, 1857. (No. 2539.)

The body of the buoy and hemispherical cover is made of metal in two or more parts, and is egg shaped in vertical section, and each part is stiffened internally by feathers or ribs, and externally by flanges. The axle is passed through the buoy horizontally at about the water level, and the ends thereof work on brass bearings fitted into a gymbal capped with screw lubricators to supply grease to the points of friction. The buoy is ballasted with cannon balls, and a manhole is provided for ob-

taining access to the interior. A valve stop-cock is screwed into the cover for rendering the vessel buoyant by charging it with hydrogen gas. To the head of the buoy a standard is bolted, to the spread arms of which an iron frame is attached to carry the bell. The buoy above the water line is covered in with corrugated sheet iron, rivetted to iron stays, and the bell also is surmounted by a hood to throw out sound.

SEYFERTH, A. *The employment of sulphuret of carbon for motive purposes, and engines and apparatuses for applying and regenerating the same.* Dated Oct. 3, 1857. (No. 2540.)

The inventor first vaporises the sulphuret of carbon in a closed vessel surrounded with water or with steam, and leads the vapour into cylinders, the pistons and piston rods of which he lubricates with water. After performing its work in the cylinders, he leads the vapour into a condenser formed of cotton, &c., held between plates, in a vessel containing water; water is caused to trickle down upon the cotton and keep it constantly wet, whereby a very extended surface is obtained by coming in contact with which the vapour of the sulphuret of carbon becomes condensed, and is then drawn off in a liquid state to again enter the vessel in which it was vaporised.

PURSALL, W. *Improvements in the manufacture of eyelets.* Dated Oct. 3, 1857. (No. 2542.)

The inventor manufactures the eyelets, which are intended to be attached to articles of wearing apparel, of mother-of-pearl, horn, bone, jet, ivory, papier mâché, wood, glass, porcelain, vegetable ivory, the shell of the cocoa-nut, and enamel, on a metallic base.

STOBBS, J., and G. R. HALL. *Improvements in pumps for raising water and other liquids.* Dated Oct. 3, 1857. (No. 2543.)

This consists in combining the barrels of two or more pumps placed side by side, the barrel of each (excepting that in which the first lift takes place) being provided at its lower end with an air-tight box so as to receive the contents of the lowermost barrel with which it is in immediate connexion, and so on for each succeeding barrel, according to the number employed.

DUNCAN, G., and W. J. JELLICORSE. *An improved smoke-consuming furnace.* Dated Oct. 5, 1857. (No. 2544.)

At the back of the fire the inventors construct a bridge over which the flame and smoke pass. Behind the bridge they form a large air chamber and dust receiver, from which the smoke and flame pass to a flue, and this flue a little beyond its mouth they divide into two, the one ascending and the other descending, the latter being made to take a circuitous course before again emerging into the ascending flue.

DAVIES, G. *Improvements in the combustion of coal without smoke, which improvements are also applicable to the combustion of other kinds of fuel.* (A communication.) Dated Oct. 5, 1857. (No. 2549.)

It is here proposed to employ a grate with the bars placed either longitudinally or transversely, and forming an inclined plane at about 15° to 35°. It is also proposed to employ a retort placed at the same angle of inclination as the bars, and in front of them.

BECKERS, L. *Improvements in apparatuses for exhibiting daguerreotype, photographic, and other stereoscopic views and pictures.* (A communication.) Dated Oct. 5, 1857. (No. 2551.)

This consists in carrying inside a box, &c., an endless belt or apron having a series of frames to receive views and pictures attached to it, so as to stand perpendicular to its face. By moving the belt, through a handle outside the box, the pictures are presented successively opposite to magnifying glasses, &c.

HARVEY, J. P. *Improved machinery for crushing land or clods.* Dated Oct. 5, 1857. (No. 2553.)

This consists in mounting two or more sets of discs (with corrugated or indented edges) on one common shaft, each set being independent of the others.

VIGERS, E. *Improvements in the construtiou of wrought-iron beams and girders.* Dated Oct. 6, 1857. (No. 2559.)

Here wrought-iron girders or beams are to be constructed of considerable length, and beams or girders of ordinary dimensions may be constructed of two side plates, each rolled in one length of a curved, convex, concave, or angular section, and with flanges of suitable width and proportions on the top and bottom edges thereof.

STEVENNS, E. *Improvements in machinery for making bread and pastry and other similar articles.* Dated Oct. 6, 1857. (No. 2567.)

This consists in a machine for mixing dough, &c. It cannot well be described without engravings.

LEGENDRE, R. N. *A new combined system of publicity applied to beneficial purposes.* Dated Oct. 8, 1857. (No. 2572.)

This consists "in combining publicity with charity, so that the efficiency of the former shall be subservient to the latter" !! This is obtained by means of an advertising sheet combined with cards or tickets of discount payable to bearer, which the issuer

is bound to accept in part payment for goods, wages, or other demands.

ALLEN, J., and J. YOUNG. *Improvements in preventing oscillation in carriages upon railways.* Dated Oct. 8, 1857. (No. 2573.)

This invention was described and illustrated at p. 368, No. 1784, Vol. 67.

BARLOW, C. *Improvements in buoyant or life-preserving garments.* (A communication.) Dated Oct. 8, 1857. (No. 2575.)

This consists in making a man's shirt or a woman's chemise capable of being inflated, and so becoming buoyant in the water, and adapted for use as life preservers.

REUVER, D. *Improvements in propelling and steering ships and other floating bodies.* Dated Oct. 8, 1857. (No. 2578.)

To lever arms are hinged flaps which, during movement in one direction, are capable of opening to act upon the water, and during the opposite movement of closing, that they more readily pass through it. These lever arms are supported each in a collar carried by a swinging frame, and at their upper ends are by adjustable means connected to rods actuated by a steam-engine. Each lever arm at the point of support has affixed to it a pinion, which is separated by a rack, by which the propellers may be turned round to propel in an opposite direction, or only partially so, when they are used for steering.

COCKER, J. *Improvements in the manufacture of wire.* Dated Oct. 8, 1857. (No. 2579.)

This relates,—1st, to a mode of reducing wire iron to a sufficiently small size to admit of the metal being drawn at once down to the intended gauge of the wire. 2d, to a method of hardening wire, and consists in winding it on metal bobbins or reels, and heating it thereon, and, while in a heated state, drawing the wire of the bobbins, and passing it direct into a bath of oil, after which the wire may be tempered in the usual way.

COCKER, J. *Improved apparatus for heating or annealing wire, wire iron or rods, or sheets of iron, or other metals.* Dated Oct. 8, 1857. (No. 2581.)

This apparatus consists of a cylinder heated externally, and through which passes a horizontal shaft or axle, mounted in two sets of bearings, that are capable of being raised and lowered when required. The wire, rods, or sheets, are wound in long lengths upon bobbins or reels, placed loosely upon the axle or shaft; they may with facility be pushed along into the cylinder. A slow rotary motion is given to the shaft.

FOSTER, E. *A new and useful or improved life-preserving berth for navigable vessels.* Dated Oct. 8, 1857. (No. 2582.)

This consists in a moveable and adjustable berth, provided with hinged flaps or keels, and floating inflatable air chambers; it may be used as a life-preserver.

WADSWORTH, J. *Improvements in the production and management of artificial light and heat, and in certain parts of apparatus applicable thereto.* Dated Oct. 8, 1857. (No. 2584.)

This consists, 1st, as applied to gas, in deflecting and subdividing the jet of gas issuing from a burner by interposition of some body, whereby the stream is partially dispersed, so as to bring it into contact with the adjacent air at numerous points. 2d, In the arrangement of suitable apparatus for carrying into effect in a convenient manner the above mode of burning gas, by supporting a wire, small rod, or other instrument in the flame of the burner. 3dly, As applied to the vapour of naphtha, or of any of the hydro-carbons, in deflecting and dispersing the vapour, by interposing a piece of wire, needle, or some similar object, and also in regulating the admixture of air with the vapour, by making the air-passages capable of being enlarged or contracted as occasion may require. And, 4thly, in the application to hydro-carbon vapour lamps of the deflecting agent before mentioned, and of convenient apparatus for adjusting the same in the path of the jet or vapour, and of suitable valves to the air-passages for controlling the admission of air.

DAVIES, R. *Improvements in washing machines.* Dated Oct. 9, 1857. (No. (2588.)

This consists in the use of a tub, having a correspondingly-shaped plunger or false bottom working vertically therein, such plunger fitting accurately the interior of the tub, and being perforated with a number of holes to allow the water to flow freely through it during its up and down movements.

POISAT, A. M. *A machine for preparing wood to be reduced into pulp for the manufacture of paper, card, and pasteboard.* (A communication.) Dated Oct. 9, 1857. (No. 2590.)

This machine consists of a revolving cylinder, on the outer surface of which are solidly fixed metal indented fillets or bands, so as to cover it with projecting teeth, against which the wood is pushed, and thus submitted to the tearing action of the teeth.

PUJOL, L. *Improvements in envelopes and letter paper.* Dated Oct. 9, 1857. (No. 2591.)

The object here is to afford a means of ascertaining the address of the party di-

recting a letter without requiring the address to be visible on the outside of the letter. The inventor gives to the flap a peculiar form, which allows him to unfasten a part of it whilst the envelope still remains closed.

BROWN, H. and W. *An improved whip socket.* Dated Oct. 9, 1857. (No. 2592.)

The object here is to render whip sockets durable, cleanly, and ornamental, and the improvements consist in making the tube part thereof of glass or metal, with shifting top and bottom, and mounted in metal or otherwise, to allow of the tube being rendered shifting or fixed as may be required.

BARNARD, C., and J. BISHOP. *An improved washing machine.* Dated Oct. 10, 1857. (No. 2594.)

This consists of a cistern to hold the washing fluid mounted on a stand, and of a cage to contain the clothes to be washed. The cage is open at the top, and the clothes are laid evenly upon the bottom of it; a fixed cover is then placed over them, and held by a bar. An up-and-down motion is given to the cage.

MILLER, G. *Improvements in apparatus for heating and ventilating.* Dated Oct. 10, 1857. (No. 2596.)

The fire grate of the heating apparatus is capable of being closed all round, so that the air to keep up combustion enters below the grate. The products of combustion are conveyed to a dome or chamber, and then pass downwards to the off pipe, and into the flue or chimney. The dampers for regulating the escape of the smoke and the admission of air are so arranged that when the supply of the air is shut off from the fire grate, the passage to the flue or chimney is enlarged, thereby increasing the ventilation.

USSHER, R. *A machine for imparting motive power to threshing machines and such like agricultural implements.* Dated Oct. 10, 1857. (No. 2602.)

This machine consists of the following parts :—1st. Horizontal beams or levers to which horses are to be attached. 2d. An upright axle, supported in a framing, and caused to revolve by being attached to the beam. 3d. A horizontal wheel fixed upon the aforesaid axle near the bottom thereof. The periphery of this wheel has a series of crutches or bent pieces of metal fixed to it, carrying an endless chain, which also passes round another smaller wheel, which is in connexion with the threshing or other machine which it is desired to work.

BUTLER, F. M. *Improvements in ventilators or wind guards for chimneys and other purposes.* Dated Oct. 10, 1857. (No. 2604.)

On the top of the flue the inventor places a pipe or tank, with an annular base flange around it, and on this flange he places vertical radial guards extending above the top of the pipe or trunk, and the inner and upper ends of these guards sustain a disc. An outer guard surrounds the radial guards, and its lower edge is on the line of the top of the pipe or trunk, and the upper end of the outer guard is contracted so as to have an opening of the same size as the vertical pipe or trunk. There is thus always ample space for the escape of gases, and no wind can blow down the pipe or trunk.

GRAY, J., and J. W. *An improved means of causing signals to be made on railways, and of otherwise preventing certain classes of accidents on the same.* Dated Oct. 12, 1857. (No. 2606.)

This consists of an arrangement by which a succession of various self-acting signals may be made on railway lines, which will indicate that a certain time has or has not elapsed since a train has passed, and whether the train so passed has or has not reached a certain point in advance; the arrangement being such that each train of carriages passing along the line may cause visible caution or time signals to be made which will continue visible for any regulated period.

WANOSTROCHT, V. *Improvements in converting muskets and other fire-arms into rifled fire-arms.* Dated Oct. 12, 1857. (No. 2608.)

This consists in introducing into the barrel of the fire-arm at the breach end a tube, by preference of about half the length of the barrel; the interior of the tube has rifle grooves formed in it, and its exterior size accurately fits the interior of the barrel. The mouth of the tube which is nearest the muzzle is bevelled to facilitate the introduction of the ball; and on the other end of the tube there is an enlargement which fits into a recess at the breech end of the barrel.

KYISHOGLOO, P. B. *Improvements in obtaining and applying motive power.* Dated Oct. 12, 1857. (No. 2610.)

For using compressed air as a motive power, the apparatus consists of a large cylindrical vessel, and into this, by pipes attached to it, the atmospheric air is compressed by compressing apparatus, the compressed air acting upon a wheel fitted with fans, and by the shaft of this wheel motion is transmitted for any purpose.

NEWTON, W. E. *Improved apparatus for roasting or torrefying coffee or other substances.* (A communication.) Dated Oct. 13, 1857. (No. 2611.)

This apparatus consists of a vessel divided into two by a partition; the first compartment contains the apparatus for

roasting, consisting of a conical vessel, at the lower end of which is a fire-place, and over this the vessel containing the coffee, &c., which vessel is mounted in bearings, and caused to rotate by a handle outside. Over this rotating roasting vessel is adapted a bell-shaped pipe, resembling a still head, the smaller end of which is bent over like the neck of a still head. The end of this bent pipe terminates in an opening in the second compartment. By this arrangement the aroma from the roasting coffee will pass through the bent pipe into the second compartment, which may be charged either with raw or roasted coffee, which will become impregnated with the aroma escaping. The products of combustion pass off by a separate flue.

HENRY, M. *Improvements in apparatus for playing loto.* (A communication.) Dated Oct. 13, 1857. (No. 2613.)

This apparatus consists of cards of different colours, or bearing numbers of different colours, which are used with counters of corresponding colours, and also checking boards or tables presenting a set of numbers for each particular colour. A set of knobs or balls, each bearing a number, is used for calling the numbers from.

DEANE, E. *An improved weapon to be used either as a sword or as a pistol, or both.* Dated Oct. 13, 1857. (No. 2615.)

This weapon is formed by combining a sword with a revolving or other pistol.

WANOSTROCHT, V. *Improvements in obtaining fatty and oily matters by distillation.* (A communication.) Dated Oct. 13, 1857. (No. 2619.)

This consists in using a retort, furnished with iron rails inside, to facilitate the introduction of a wagon containing the material to be distilled. The heat is regulated so as to cause fatty and oily vapours to be produced, but not to volatilise the tar or other similar product. The vapours are conducted by a pipe from the bottom of the retort to a condensing vessel. The bottom of the retort is sloping, so that the tar may be prevented passing into the condenser by flowing through a branch pipe proceeding downwards into a receiver.

YATES, J. *Improvements in machinery or apparatus used in preparing and spinning fibrous materials.* Dated Oct. 13, 1857. (No. 2620.)

This relates to top rollers, and consists of making one of the bosses loose and the other fast on the spindle, so that if one of them should be made a little larger than the other in the process of covering, each of them will regulate or adjust its own speed. The inventor makes the spindle of the ordinary shape, but on that end which has the loose boss he cuts a thread on which he screws a nut to fill up the end of the boss, and keep it on the spindle, as well as to prevent the lubricating matter running out on the work, and also the flyings from fastening the loose boss.

SHARMAN, W. *An improved metallic compound applicable to the manufacture of various useful and ornamental articles.* Dated Oct. 13, 1857. (No. 2621.)

This consists in mixing zinc with lead and tin in the proportions from 10 to 18 per cent. of zinc and lead, with 64 to 80 per cent. of tin.

KOPISCH, C. G. *Improvements in propelling vessels by means of heated air, without screw or paddle, thereby saving fuel and ship's-room.* Dated Oct. 14, 1857. (No. 2622.)

The inventor uses a blowing machine for driving cold air through the grates of the boilers: this air is heated to 1,000 deg. or more. A part of that heat is lost in making steam, but the remaining part leaves the air expended. "Thus," says the inventor, "the previous power of the blowing machine is doubled for its application." The heated air rushes out into the water through tubes on the sides or behind the ship, and thus she is moved without screw or paddle, like the rocket, or the Scotch mill.

PROVISIONAL PROTECTIONS.

Dated May 14, 1858.

1090. John Macintosh, of North Bank, Regent's-park. Improvements in insulating telegraphic wires.

Dated May 19, 1858.

1114. Joseph Maudslay, of Lambeth, engineer. An improvement in the manufacture of iron, and in the furnaces employed therein.

Dated May 21, 1858.

1130. John Charles Brant, of Surrey-square, Old Kent-road. Improvements in the permanent way of railways.

Dated May 24, 1858.

1158. John Scholfield, of Rochdale, cotton spinner, and William Cudworth, of the same place, manager. Certain improvements in machinery or apparatus for preparing, doubling, and twisting cotton, and other fibrous substances.

1160. George Hamilton, of St. Martin's-le-Grand, and William Henry Nash, of Poplar, engineer. Improvements in locks and keys.

Dated May 25, 1858.

1162. John Arthur Phillips, of Earl's Court-terrace, Kensington, mining engineer. Improvements in the production of zinc, lead, copper, and silver, from ores containing these metals.

1164. George Woodward Morse, of Baton Rouge, United States. An improvement in fire-arms, and cartridges to be used therewith.

1166. Charles Frederic Dietz Monnin, of Paris, merchant. Improvements in the manufacture of

rivets, screws, spikes, pins, and nails, and in machinery for that purpose. A communication.

1170. Julien François Belleville, of Paris, civil engineer. An apparatus for indicating the work of pumps.

1172. William Edward Newton, of Chancery-lane. Improvements in breech-loading fire-arms, and cartridges for the same. A communication.

Dated May 26, 1858.

1174. Frederick Albert Gatty, of Accrington, manufacturing chemist. Improvements in treating cotton or cotton yarns and fabrics when dyed with certain colours.

1176. Jozé Luis, of Welbeck-street, Cavendish-square. An apparatus for baking fire-brick clay. A communication.

1180. John Charley Riddel, ironmonger, of Belfast, and David Ritchie and Andrew Watson, ironfounders, and John Fleming Allan, pattern-maker, of Glasgow. Improvements in cooking ranges, and other fire-places.

1182. William Bayliss, of Wolverhampton. Iron tubular fencing, to be used for general fencing as well as for the purposes of irrigation, and conveying water where required for agricultural or horticultural purposes.

1184. Pierre Antoine Fourgassié, of Castres, France, banker. An apparatus for clod-crushing, rolling, weeding, and scarifying, clearing, or preparing land. A communication.

1186. Samuel Cunliffe Lister, of Bradford, and James Warburton, of Addingham, spinners. Improvements in spinning.

1188. Ferdinand Bouquié, of Paris, civil engineer. Improvements in the manufacture of chains.

Dated May 27, 1858.

1190. Joseph Schofield, of Rashcliffe Lockwood, near Huddersfield, Ironfounder, and George Harling, of Almondbury, York, mechanic. Improvements in means or apparatus employed in weaving.

1194. George Hinton Bovill, of Wimbledon. Improvements in the manufacture of fuel.

1196. Charles Clarke, of Exning, Suffolk. Improvements in machinery for dibbling wheat and other grain or seeds and manure.

Dated May 28, 1858.

1198. Samuel Osler, of Great Yarmouth. The manufacture of fish into guano and food.

1200. Thomas Dunn and William Irlam, of Manchester, engineers. Improvements in machinery for altering the position of locomotive engines and carriages on railways.

1202. Marc Antoine François Mennons, of Paris. An aperient biscuit. A communication.

1204. James Frederick Lackersteen, of Young-street, Kensington, civil engineer. Improvements in machinery for cutting and splitting wood.

1206. Auguste Arnal, of Paris, merchant. A nose bag for horses.

PATENTS APPLIED FOR WITH COMPLETE SPECIFICATIONS.

1326. Lucius A. Bigelow, of High Holborn. Improvements in sewing machines. A communication. Dated 11th June, 1858.

1333. George Tomlinson Bousfield, of Loughborough-park, Brixton. Improvements in marine steam engines. A communication from D. Barnum. Dated 11th June, 1858.

1348. Charles Constant Joseph Guffroy, merchant, of Lille, France. A new smoke consuming apparatus, and also a new method of introducing the coal or fuel into it. Dated 15th June, 1858.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," June* 22, 1858.)

240. R. Millard. A portable chair.

254. A. Chambers and W. H. Champion. Improvements in railway breaks.

256. R. Bell. An improvement in stable pans, sinks, and urinals.

258. B. Looker, jun. Improvements in sockets for receiving telegraphic and other posts or uprights.

259. C. Johnson. Improved machinery or apparatus for performing different operations required in agriculture.

271. A. V. Newton. An improved construction of sewing machine. A communication.

274. J. Macintosh. An improvement in treating articles of gutta-percha made or formed in dies or moulds, also certain articles of gutta-percha made by expressing through dies, and also articles of gutta-percha made by pressing rollers.

277. J. C. H. Sievier. Improvements in submarine conductors of electric telegraphs.

279. W. Spence. Improvements in telegraphic apparatus. A communication.

290. W. E. Newton. Improvements in treating certain oils and fats so as to effect the separation of constituent parts of such oils and fats. A communication.

306. J. Piddington. Improvements in the manufacture of fuel, commonly called artificial or patent fuel.

309. W. E. Newton. An improved optical instrument, which the inventor denominates a tropescope. A communication.

310. G. Claridge and R. S. Roper. An improved mode of manufacturing coke.

313. H. Blair. Certain improvements in the method of recovering sulphur, which has been used in the manufacture of soda ash, and in the apparatus connected therewith.

314. F. Jones. Certain improvements in machinery, or apparatus for cutting "Piassava" or other fibrous substances employed in the manufacture of brushes, which said improvements are also applicable to other purposes of cutting.

315. J. Beattie. Improvements in locomotive and other steam engines, parts of which improvements are respectively applicable to other purposes.

316. W. Riley. An improved method of raising and lifting water from the bilge or holds of ships and other vessels, and in a peculiar construction and arrangement for effecting the same.

319 R. Griffiths. Improvements in screw propellers and apparatus for governing engines used to give motion to screw propellers.

333. F. M. Baudouin. Improvements in electric telegraph cables.

347. J. Potts. Improvements in machinery for cutting and shaping toothed gearing.

352. R. A. Brooman. Improvements in apparatus for separating substances of different specific gravities. A communication.

360. E. Borlase. Improved apparatus for separating metals and metallic ores from other mineral substances.

367. W. E. Newton. The application to carts or other vehicles of apparatus for weighing the load contained in such vehicles. A communication.

380. A. V. Newton. Improved machinery for grinding and polishing glass, stone, metal, and other substances. A communication.

386. A. J. Dessales. Improvements in oil lamps for railway carriages, ships' cabins, and other purposes.

405. W. E. Newton. Improvements in the treatment or preparation of maize or Indian corn,

previous to grinding the same into flour. A communication.

468. J. H. Johnson. Improvements in the decoration or ornamentation of leather, cloth, and similar fabrics, and the application of the same to various useful purposes. A communication.

484. W. Harding. Improvements in breech-loading fire-arms.

669. W. Harding. Improvements in revolver fire-arms and in apparatus for manufacturing projectiles.

707. A. Pelez. A new steam-piston for horizontal and vertical engines. A communication.

899. J. P. Pirsson. Improvements in the condensers of steam engines.

1019. C. J. Carr. Improvements in forge and other hammers.

1083. J. Gardner. An improvement in chaff-cutting machines.

1134. G. F. Muntz. An improvement in preparing yellow metal sheathing.

1159. W. Harding. Improvements in revolver fire-arms.

1174. F. A. Gatty. Improvements in treating cotton or cotton yarns and fabrics when dyed with certain colours.

1190. J. Schofield and G. Harling. Improvements in means or apparatus employed in weaving.

1194. G. H. Bovill. Improvements in the manufacture of fuel.

1239. C. Wheatstone. Improvements in electric telegraphs and in apparatus connected therewith.

1241. C. Wheatstone. Improvements in electro-magnetic telegraphs and apparatus used for transmitting signs or indications to distant places by means of electricity.

1264. J. H. Johnson. Improvements in railway wheels, and in axle-boxes and bearings for the same. A communication.

1326. L. A. Bigelow. Improvements in sewing machines. A communication.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

1367. Henry Bridgewater.
1379. Louis Henri Réal.
1382. Henry Bessemer.
1384. Henry Bessemer.
1385. Thomas Blanchard.
1393. John Henry Johnson.
1398. John Macintosh.
1416. William Edward Newton.
1418. John Louis Jullion.
1432. Oliver Rice Chace.
1445. Ignace Joseph Silbermann.
1459. Benoit Bonnet.

LIST OF SEALED PATENTS.

Sealed June 18th, 1858.

3118. Richard Furnival.
3119. William Walker.
3127. William Thrift and Adam High.
3145. George Bridge and Job Hamer.
3161. George Burley.
3164. Benjamin Burleigh and Frederick Ludwig Danchell.
3193. Richard Harmer.
476. Henry Deacon.
553. James Webster.
828. Astley Paston Price.
830. Astley Paston Price.
857. Edward Kilwick Calver.
858. John Armstrong.
874. James Copcutt.
882. Samuel Clegg.

Sealed June 22d, 1858.

3142. Morris Landou.
3146. Daniel Jones Crossley.
3147. Thomas Landi and Charles Falconieri.
3150. Augustus Frederick Kynaston.
3151. Joshua Moss, Thomas Gamble, and Joseph Gamble.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Dates of Registration.		Nos. in the Register.	Proprietors' Names.	Addresses.	Subjects of Design.
June	2	4093	J. Clayton	Wolverhampton	Air Furnace.
	4	4094	M'Intyre, Hogg, & Co.	Addle-street	Shirt.
	9	4095	M. Phineas	Liverpool	Inkstand.
	10	4096	J. Jaques	Hatton-garden	Chess Board.
	,,	4097	Cartwright and Ryall	Lincoln	Steam Boiler.
	15	4098	J. Morris	Redditch	Needle-case & Pincushion.
	17	4099	J. F. Elwall	Kennington	Stay-fastener.
	18	4100	Fowler and Fry	Bristol	Tumbler Cart.
			PROVISIONAL REGISTRATIONS.		
May	27	986	J. Chatwin	Birmingham	Globe Holder.
	31	987	J. Inderwick	Leicester-square	Pipe.
	,,	988	do. do.	do. do.	do.
	,,	989	do. do.	do. do.	do.
June	1	990	H. Redsull	Deal	Self-acting Fid.
	18	991	T. G. Messenger	Loughborough	Garden Engine.
	,,	992	G. Hurn	Norwich	Nose Bag.

NOTICE TO CORRESPONDENTS.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

CONTENTS OF THIS NUMBER.

Harwood's Patent Reaping Machine (*with engravings*)		601
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Hughes' Printing Telegraph		607
Instantaneous Photography		608
Our Coast Defences		609
The Stability of Floating Bodies (*with an engraving*)		610
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